Covering the Texas Instruments Brand of Home Computers

99'er HOME COMPUTER magazine

February, 1983 , $3.50 in U.S.A.

Printers in the Home

- Two New TI Computers Unveiled
- Expanding Your System with Compact Peripherals
- The Voice of Parsec
- Learning with LOGO & ASPIC
- Speech Recognition for the Home Computer

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89/2

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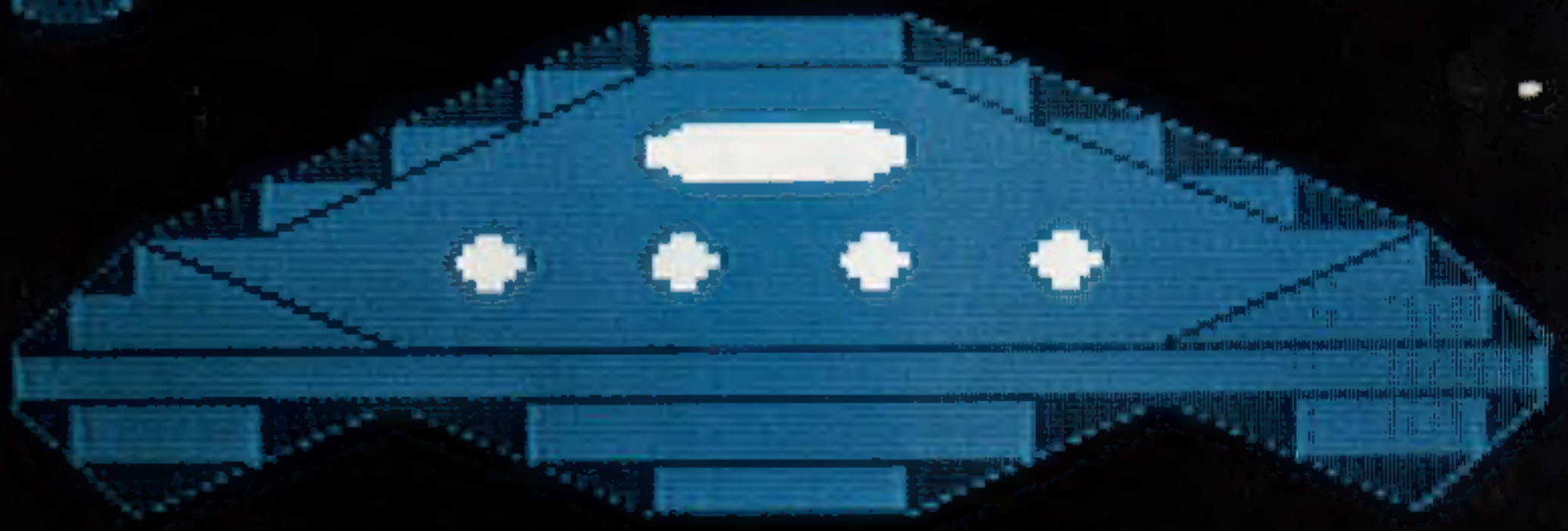
Position _____

School _____

School Address _____

City/State/ZIP _____



ATTENTION, EARTHPEOPLE!
AN IMPORTANT MESSAGE FROM MOONBEAM SOFTWARE
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Moonbeam Software will turn your computer into an arcade machine! Super-fast action games now ready to take over your controls! Dazzling full-color graphics! Explosive sound effects! All now available in TI-BASIC and/or Extended BASIC for the 16K console!

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Dealer inquiries invited. Call Mr. Moon at (413) 586-6290.

MOONBEAM SOFTWARE
2 Bridge St., Northampton, MA 01060
Telephone (413) 586-6290

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(Please circle C for cassette or D for diskette versions)

☐ DEATH DRONES	C D	$14.95	
☐ MOONVASION	C D	14.95	
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☐ STRIKE FORCE 99	C D	19.95	
☐ MOONBEAM EXPRESS	C D	19.95	
☐ ASTROMANIA	C D	19.95	

GAMES ..... $_____
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Shipping & Handling 1.50
TOTAL ..... $_____
☐ MC ☐ VISA Exp. Date _____
Card No. _____

Name _____ Signature _____
Street _____
City/State/Zip _____

OUTSIDE 99'ER

This Issue's Cover

All the comforts of home . . . This month's cover depicts a new "comfort" that your Home Computer system can offer—freedom from the drudgery of handwritten record keeping and tedious typing. With a printer, your computer can take over all kinds of time-consuming word processing tasks. After all, if your home is really your castle, you shouldn't be bothered with menial secretarial chores there. So make room in the spare turret, throw aside your obsolete writing implements, and roll out the "Data Welcome" mat. This labor-saving peripheral can indeed become your trusted scribe.

INSIDE 99'ER

As the invention of movable type changed the course of civilization, so has the availability of the printer radically altered the role of the Home Computer. The addition of this peripheral transforms your computer from an efficient file clerk to a top-notch secretary. This month, we look at a possible missing link in your Home Computer system—a small machine that can convert your vast storehouse of "soft" information into "hard copy."

To find out if you really need a printer, or to help you decide what kind you want, you'll need a clear explanation of printer basics. *Who Needs a Printer?* describes the different kinds of printers, explains how they work, and points out the important features you *do* and *don't* need.

You're convinced—and you want that printer in time to print out your Valentine mailing list. But before you go shopping, do some comparing. *Printers on Review* carefully looks at five TI-compatible models, noting structural differences and comparing such factors as speed, quality of print, cost, and graphics.

Speaking of graphics, in *Chuck-A-Luck, Part 4* we will be completing our game-programming lesson with instructions for displaying the rolling dice. And keep your eye on those tumbling sprites. They are classic representations of the vector, according to this month's *LOGO Times* lead article. *Vectors in LOGO: Of Stars and Sprites* demonstrates how TI LOGO and sprites can help students understand the concept of vectors at an early age—well before college physics, when it is traditionally presented.

While you're in a mathematics (and graphics) mode, try your hand at *Daisies*, a program that demonstrates how LOGO can use trigonometric functions to graphically display the delicate petals of a richly recursive daisy.

Do trigonometric functions and vector analysis seem a bit heavy on the brain? Then maybe you need a gaming break. *Lifeline to Titan* may not, however, prove to be an especially relaxing interlude. It will require precise timing and careful maneuvering to land your spacecraft safely on the rugged terrain of Saturn's largest moon.

For a truly relaxing break, why not turn to Professor Holl's latest pocket program, *Tower of Hanoi*? Professor Holl offers a new twist on an old game classic, carefully explaining this simple program so that even beginners can use it to test their TI BASIC programming and gaming skills.

Gaming skill is the subject in Part 2 of *The Joy of Adventuring*. Here you'll find concrete strategies for outwitting the dragons, warlocks, and other fiends who dog your steps as you run through these adventure games. Even if you fancy yourself a master of the adventure game genre, this piece can teach you a trick or two.

And fancy tricks for learning math are presented in *ASPIC: A Language for Teachers*. Two of the four ASPIC programs in the article use graphics to illustrate such concepts as "square numbers" and odd vs. even. The others are drill-type programs designed to familiarize students with long division and multiplication.

An already familiar voice speaks up in *Twenty Questions with the Voice of Parsec*. The young woman whose voice you hear on the *Parsec* game tells how it feels to have thousands of dedicated game players jumping to her commands . . .

And you are commanded to man your battle station in *Night Blockade*. Firing into the night, you must defend your battleship against an aggressive enemy you can't even see!

In the midst of the blinding explosions and deafening cannon fire, you catch something strange on your radar screen. Enemy reinforcements? No, the signals are coming from a friendly source. Looming on the horizon is a dazzling array of new audio-visual hardware, a mountain of luminescent display screens, and a whole passel of robots—it's the *Consumer Electronics Show*. Your *99'er Home Computer Magazine* correspondents were there to provide a detailed report on the latest in TI hardware, software, and peripherals. Proof positive that TI will never run out of exciting new ideas.

Until next month, have fun reading, learning, and RUNning!

47. **Vectors in LOGO: of Stars and Sprites**
—By Richard Blee

48. **Daisies: Math Flowers With LOGO**
—By Roger B. Kirchner

Programming Conventions

KEY-IN REFERENCE

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
 !"#$%&'()*+,-./0123456789:;<=>?
@abcdefghijklmnopqrstuvwxyz{|}~
```

- Program as listed will completely fill available memory of TI 99/4A and cannot be RUN with disk controller (and possible RS232 interface) turned on. It must be SAVED and RUN from cassette. It may also possibly be SAVED and RUN from disk in Extended BASIC with the 32K memory peripheral IF the last 3 character sets were not used.
- End of Program or Article

99'er HOME COMPUTER magazine

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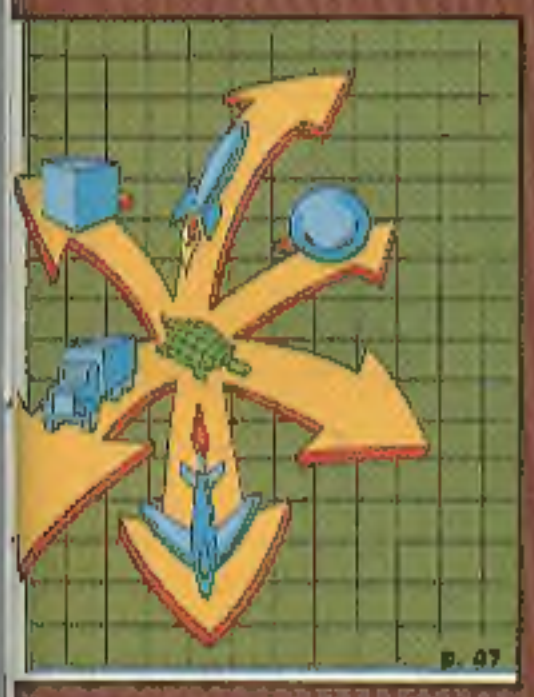
February, 1983

Vol. 2, No. 4

SPECIAL FEATURE

Texas Instruments at the Winter Consumer Electronics Show

41.

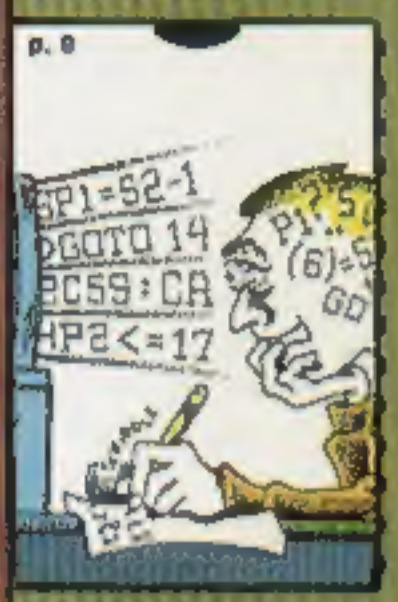


p. 47

99'ER VERSION

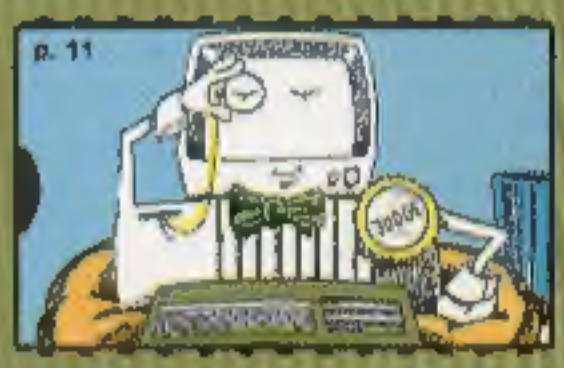
2 . 4 . 1 . XB AL MM EM

- Volume no.
- Issue no.
- Version
  - 1 = original program
  - 2, 3, ... = no. of update
- Extended BASIC
- Assembly Language
- Mini-Memory Required
- 32k Expansion Memory Required



p. 22

p. 58



p. 11

8. Who Needs A Printer?!
—By Charles M. Ehninger

11. *Printers on Review*
—By W.K. Balthrop

22. Professor Holl's Pocket Programs:
Tower of Hanoi
—By S.T. Holl

36. ASPIC: A Language for Teachers
—By Andrew Berner and Kathleen Martin

4. Inside 99'er
6. On Screen
7. Letters to the Editor
46. Debugs on Display
67. Index to Advertisers

FEATURES

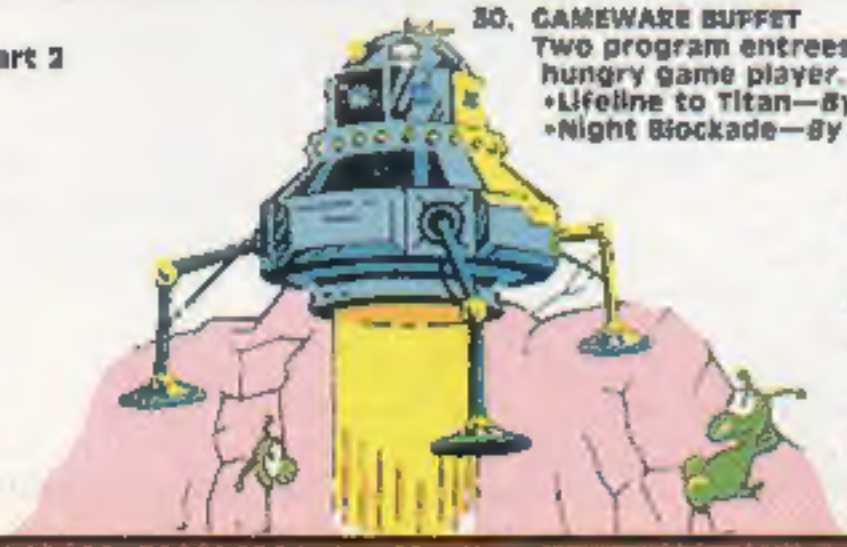
25. The Joys of Adventuring—Part 2
—By Samuel D. Pincus

27. Chuck-A-Luck—Part 4
—By Samuel D. Pincus

55. Arcade Arbiter Review

40. Twenty Questions
With the Voice of Parsec

30. GAMEWARE BUFFET
Two program entrees for the hungry game player.
•Lifeline to Titan—*By Bill Bies*
•Night Blockade—*By Ants Reigo*



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ON SCREEN

By Gary M. Kaplan
Publisher & Editor-in-Chief

The "$500 Word Processor"—an impossible dream? It certainly used to look that way. Even as recently as last year, a computer with an 80-column display, letter-quality printer, and word-processing software cost at least several times that figure—and my targeted "dream price" for an affordable, complete word processor seemed light years away. But now I'm not so sure . . .

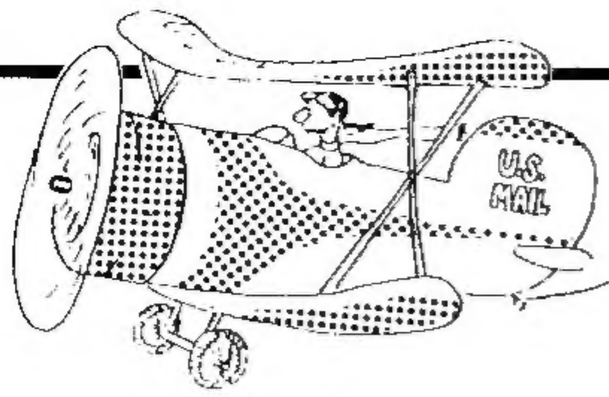
It will take quite some doing, of course, before any manufacturer can turn this dream into reality. A few obstacles still have to be overcome—an obvious one being the price of printers. But judging from how far we've come over the last two years—witness the rate at which home computers are being gobbled up by eager consumers—a new time frame is entirely possible: Technological breakthrough—fueled by typical mass-market production quantity—should result in an economy of scale that will drive component and assembly prices low enough to eventually reach the magic $500 barrier. So what's the time frame? And who will achieve it first? I'm betting on Texas Instruments—and within 18 months!

Technology and manufacturing economy are, in fact, progressing so fast now that the old "rules" just don't apply anymore. There is no longer a clear-cut separation between low-cost "family computers" (of which the TI-99/4A is now clearly the industry leader) and the more expensive "business/professional machines" used mostly for word processing, spreadsheet, and database applications. Relatively inexpensive-yet-sophisticated software products such as Multiplan™, TI-Writer, and Personal Tax Plan, as well as TI's 99/4A Home Computer implementation of the p-System™ are examples of this convergence. The trend was very obvious at the Consumer Electronics Show (CES) in Las Vegas last month. There was a clear sign that hardware prices are plummetting, lower-cost peripherals are on the way, and software is finally in abundance; for the first time, the consumer really has a *choice* in system configurations.

If 1982 was "The Year of the Home Computer," then 1983 will be "The Year of Software." The quantity of game software we saw and heard announced at the show was staggering. All I can say is, "Hold on tight to your joysticks—the arcade dam is about to break wide open . . ." Such well-known names as Walt Disney, 20th Century Fox, CBS, Thorn-EMI, Milton Bradley, and Parker Brothers will be producing software for game cartridges that will run on the TI-99/4A.

Starting with the March Issue, *99'er Home Computer Magazine* will begin regular coverage of the two new TI computers, the stackable line of compact peripherals, and the virtual flood of forthcoming software. The wealth of technical information and photographs that our team of editors obtained at the CES new-product debut (beyond what is revealed in this issue) will be presented in a series of articles over the next few months. This advance coverage will (we hope) prepare you for the time (in the first and second quarters, 1983) when the products actually appear on the shelves. And during the rest of the exciting year ahead, we will feature programs, useful applications, and tutorials on the new products. You can therefore expect to see a greatly expanded *99'er Home Computer Magazine*. And yes, as you have noticed, we did slightly change our name and logo. This new identity is necessitated by the increased product coverage, and makes our magazine's focus more easily recognizable on newsstands everywhere.

By the way, we're still looking for more technical writers, editors, and programmers to join our rapidly expanding operation here in Eugene, Oregon. If you've got the qualifications and are interested, please drop me a line.



LETTERS TO THE EDITOR

Dear Sir:

Happy to see you've gone monthly. Now I won't have to wait so long for my favorite magazine!

This letter is in response to one from Carol Bax from Lynnfield, MA in the November issue, who requested a program for putting a simple problem, as in her example "A+B=?", up into the middle of the screen.

Without having to resort to Extended BASIC or a long involved program in BASIC, I would like to submit this simple, eight-line program as a solution to the problem:

```
10 CALL CLEAR
20 INPUT "PROBLEM?":A$
30 CALL CLEAR
40 PRINT TAB(11);A$
50 FOR X=1 TO 10
60 PRINT
70 NEXT X
80 GOTO 20
```

Line 10 clears the program from the screen after the initial RUN.

Line 20 brings up the INPUT line and the cursor. In response, type in the problem and press ENTER.

The TAB in line 40 will move the copy to the approximate center of the screen, provided the copy is as short as her example.

The FOR-NEXT Loop in line 50, 60 and 70 tells the computer to print ten lines of nothing (blank lines), after the copy. This has the effect of scrolling the copy up to just about the center of the screen.

Line 80 puts the INPUT line back on the screen in preparation for the next problem while the first problem is still displayed.

You must use FCTN-4 (CLEAR) to exit the program.

Oops! I forgot line 30. This clears the old INPUT line and the typed-in copy from the screen, leaving only the problem, and the new INPUT line at the bottom of the screen.

I'm looking forward to the next issue of the 99'er!

Ted Whomsley
Anaheim, CA

Thanks, Ted, for a nice simple solution.

Dear Sir:

Why doesn't the new space game, Parsec, work on the 99/4 console? Why don't the advertisers who sell the module alert 99/4 owners of this shortcoming?

Javier Narvaez
State College, PA

Alas, Javier, Parsec will NOT work with the old TI-99/4 console because of an improvement in Video Display Processor (VDP) components. (The VDP type in the TI-99/4 was the TMS9918 while the TI-99/4A uses the new TMS9918A.) The horizontal scrolling of the planet's surface was programmed in the high-resolution graphics mode only found in the new VDP "chip." By the way just changing the VDP chip in the TI-99/4 will NOT make it compatible with Parsec because of special interrupt-driven capabilities of the 99/4A that were also used in the programming.

Dear Sir:

I just got the November 99'er. What can I say except "great." I've been starving for a monthly magazine worth a darn! I also enjoyed the joystick conversion routine by David Lewis, and the fix for Force 1. However there were a couple of things missing. Line 1680 of the "fix" (pg. 7) should read: ON JZ GOTO 1730, 1690, 1730, 1700, 1730, 1710, 1730, 1720, 1730.

Also this necessitates changing Line 640 or the star-field won't move properly. Line 640 should read: IF JS=1 AND K=0 THEN 660 ELSE IF JS=0 AND S=0 THEN 660.

This passes control to 660 if there is no change in position of the gunsight and changes the star-field if there is.

All in all, not bad though!

Keep up the excellent work, guys.

Jim Lewis
Champaign, IL

Thanks, Jim, for showing us the error of our ways. We checked out your method and it works fine. Many readers sent in other corrections for this FORCE 1—joystick problem . . .

Dear Sir:

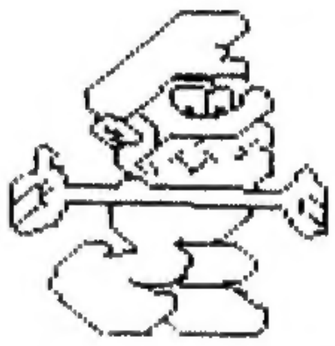
I am sending you a tape for the TI-99/4A computer. The first program is a drawing of "Papa Smurf" and the second program shows a ghost flying from a "Haunted House" to his grave. I would like to know how to add some sound effects and color. I have made several other drawing programs: Pac-man, Pink Panther, Woody Woodpecker, E.T., Bugs Bunny and others. I have also made up some games.

I am twelve years old and have had my computer since Christmas 1981. For my last birthday, I received Tunnels of Doom, Parsec and Extended BASIC. I am interested in trying the Adventure series.

I love getting the 99'er Magazine and have sent for back issues. I think it would be great to include some articles by kids who are using the computer and their problems with games and programming. I have made up eleven tapes of ideas myself. I would like to know what you think of my programs.

Mike Johnson
Schaumburg, IL

Well, Mike, you certainly understand TI BASIC statements CALL CHAR, CALL HCHAR, and CALL VCHAR very well. It must have taken a long time to figure out all the character definitions for the two line drawing programs you sent in! We used the Screen Dump for Mini-Memory (see November 99'er page 19) to print a copy of your Papa Smurf drawing on the TI-99/4 Impact Printer:



Now you can learn about sprites from your new Extended BASIC manual. Yes, we'd love to have articles from all our young 99'ers out there—especially with photos, showing you at your computers.

Dear Sir:

Your magazine is number one. I couldn't ask for a better written or more informative magazine. None of the other magazines hold a candle to the level of interest your 99'er produces in me. Please continue the excellent work. (When your billing dept. informs me of "Renewal Time," you can bet I will.)

Do you project either TI or some third party making up a card for the TI-Box that will allow use of the many APPLE programs?

Fred Deissinger
Jacksonville, NC

Fred, we are not aware of any BASIC language conversion cards for the TI-Box being available or even in the planning stages. By the way, you don't have to wait for our billing department to send a renewal notice to renew . . .

Dear Sir:

I would like to express that your magazine is absolutely the very best thing that has happened to TI-99/4A users. I am delighted that you are going on a monthly schedule. I also applaud your decision to go to larger print for the programs listed in the games section.

Doyle W. Davis
Lubbock, TX

I am glad you like the larger print for the programs, Doyle. It is always a hard decision to balance

Continued on p. 21

Entering 99'er Programs

New readers should be aware that within the magazine's pages are found actual computer programs that *you* can put into your Home Computer and enjoy.

Make sure you have any special system components required by the program (i.e., the Speech Synthesizer, Extended BASIC cartridge, etc.). Then, using the console keyboard, you can type the printed magazine listing (character for character, and line by line) into the computer's memory.

Before entering the program, connect a cassette recorder to the computer. Make sure you have two blank cassette tapes. For each 10-20 lines you type in, use SAVE CS1 to save that program segment onto one of the tapes. Alternate between the two tapes each time you save the program. Be sure to rewind to the beginning of each tape before saving, so that you always record over and replace the shorter segment of program lines with the longer segment. By following this procedure, you'll always retain most of your work even if the lights go out or someone turns off the computer.

Double check your typing against the program listing for errors, and *then* have someone else check it. The most common errors are typing the letter "O" instead of the number "0" (zero)—they are *not* interchangeable to the computer. This is also true for the letters "I" and "L" and number "1" (one). [See "Key-In Reference" on p. 4]

Every time you make a correction to your program, SAVE CS1 and switch the tapes. Once all the errors are corrected, you will have a good copy of the program on the last tape. Before turning off the computer, put the other cassette tape in your recorder and once again SAVE CS1. Now, if one tape gets damaged, you won't have to enter the program listing via the keyboard all over again. Have fun and happy computing. 99'er

TI's Home Computer.
Steve Jobs never gave you this much for your money.

We think the Apple™ is a good computer. But, for less than ⅓ the price* you can get a TI-99/4A Home Computer with this generation's microprocessor (the 16-bit 9900 family), built-in TI BASIC, 16-color capability, 5 octaves of music, 3-part harmony, numerous sound effects, and the ability to plug in RAM-saving Solid State Software™ ROM cartridges.

Plug-in ROM. Think about that for a minute.

Since the operating system is also in ROM it means that the TI-99/4A's 16K RAM is fully usable. And, when you expand RAM to 52K, it too is fully usable.

With our Peripheral Expansion System you can plug in Memory Expansion, plus an RS-232 interface (with 2 serial and 1 parallel port), and a Disk Controller that runs three of our single-sided drives (or other peoples' double-sided drives). You can even add the UCSD p-System† by plugging in a p-Code Card.

We also have joysticks for games, a Speech Synthesizer with an unlimited vocabulary**, phone coupler for data access, and a high quality 10-inch color monitor.

Now that's a lot of high-powered, sophisticated computer for the money. That's why, when you decide on a computer for the family, we just don't think you'll pick an Apple.

Creating useful products and services for you.

TEXAS INSTRUMENTS

*based on manufacturers' suggested retail price for consoles
**with Terminal Emulator II Cartridge
†UCSD Pascal and UCSD p-System are trademarks of the Regents of the University of California.
Apple is a registered trademark of Apple Computer, Inc.

Think of it—

The 99'er Questionnaire

This 4-minute Questionnaire can *actually* impact the Home Computer revolution!!!

FOR ALL READERS

1. **Are you presently a subscriber?** ☐Yes ☐No
2. **If not, do you intend to become one within the next 3 months?** ☐Yes ☐No
3. **If not a subscriber, where did you get your copy?** ☐Newsstand ☐Supermarket ☐Bookstore ☐Airport ☐Users group ☐Computer store ☐Chain/department store ☐Borrowed from friend ☐Other place
4. **What category of articles do you enjoy the most?** ☐BASIC programming tutorials ☐System tutorials ☐Photo features & news items ☐Game programs ☐Education programs ☐Utility programs ☐Product reviews ☐LOGO articles
5. **How much total time do you spend with each issue?** ☐Less than 2 hours ☐2-4 hours ☐5-7 hours ☐8-10 hours ☐11-13 hours ☐over 14 hours
6. **How many other computer-related magazines do you currently read?** ☐None ☐1 ☐2-4 ☐5 or more
7. **Are you** ☐Male ☐Female ☐Under 16 years of age ☐16-20 ☐21-25 ☐26-30 ☐31-35 ☐36-40 ☐41-50 ☐over 50
8. **Are you a student?** ☐Yes ☐No
9. **What is your annual household income?** ☐Under $5000 ☐$5000-$9999 ☐$10,000-$14,999 ☐$15,000-$19,999 ☐$20,000-$24,999 ☐$25,000-$30,000 ☐over $30,000
10. **What is your ZIP code?** ☐☐☐☐☐

FOR READERS WHO DON'T YET HAVE A TI COMPUTER

1. **Do you intend to buy a TI computer?** ☐No ☐Yes (within 3 months) ☐Yes (within 3-6 months) ☐Yes (within 6-12 months)
2. **Which do you think you'll purchase?** ☐TI-99/4A Home Computer ☐TI-99/2 Basic Computer ☐Compact Computer 40
3. **What do you anticipate your primary use of a TI computer will be?** ☐Entertainment ☐Education ☐Computer literacy ☐Household management ☐Job-related homework ☐Business ☐Professional use

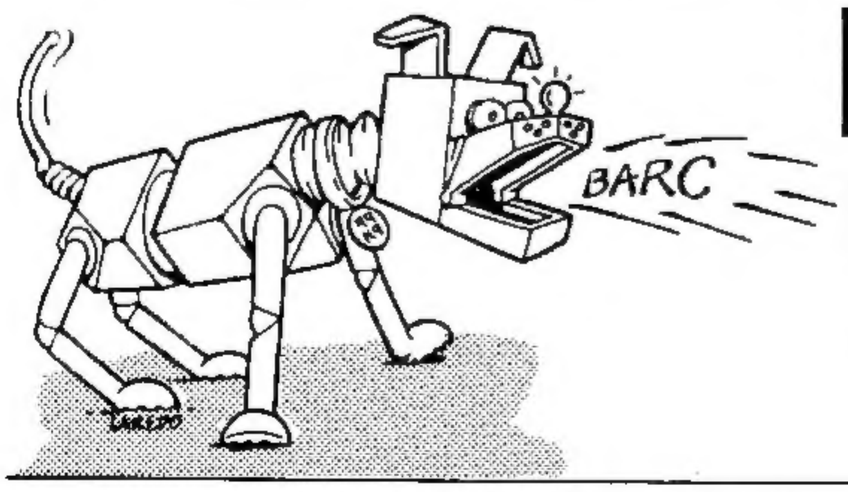
FOR PRESENT TEXAS INSTRUMENTS COMPUTER USERS

1. **Which system(s) do you currently own?** ☐99/4 ☐99/4A ☐99/2 ☐CC-40
2. **What was your primary reason for buying it?** ☐Entertainment ☐Education ☐ Computer literacy ☐Household management ☐Job-related homework ☐Business ☐Professional use
3. **What was your primary reason for buying the Texas Instruments brand?** ☐Company name/reputation ☐Features for the money ☐16-bit microprocessor ☐Convinced by friends/relatives ☐Ease of use ☐Prior use in course or "Advantage Club"
4. **Which additional TI computer are you likely to purchase within the next 6 months?** ☐None ☐99/4A ☐99/2 ☐CC-40
5. **What peripherals do you currently use?** ☐Cassette recorder ☐Disk controller & drive(s) ☐Peripheral Expansion Box ☐RS232 ☐32K Memory Expansion ☐TV ☐B/W monitor ☐Color Monitor ☐Speech Synthesizer ☐Joysticks ☐Printer ☐Modem ☐p-Code Card ☐Hex-bus Adapter ☐Wafertape Drive
6. **Put a CIRCLE around the above peripheral you are most likely to buy within the next 6 months.**
7. **Mark all TI language software you own or plan to buy within 6 months.** ☐Extended BASIC ☐99/4A Editor/Assembler ☐UCSD Pascal ☐LOGO ☐Forth ☐Mini Memory ☐Pilot ☐CC-40 Editor/Assembler
8. **How much money do you expect to spend within the next 12 months on your computer system?**
   - **Software** ☐None ☐less than $30 ☐$30-50 ☐$51-100 ☐$101-250 ☐over $250
   - **Peripherals** ☐None ☐less than $50 ☐$50-100 ☐$101-250 ☐$251-500 ☐over $500
   - **Books** ☐None ☐less than $10 ☐$10-25 ☐$26-50 ☐over $50
   - **Blank tapes & disks** ☐None ☐less than $15 ☐$15-35 ☐$36-75 ☐over $75
   - **Furniture, dust covers, & accessories** ☐None ☐less than $25 ☐$25-100 ☐over $100
9. **How many software CARTRIDGES do you expect to purchase within the next 12 months?** ☐None ☐1-3 ☐4-7 ☐8-12 ☐over 12
10. **What % of the above CARTRIDGES will be for entertainment?** ☐0% ☐less than 25% ☐25-50% ☐51-75% ☐76-100%
11. **Circle above what % of the CARTRIDGES will be for education.**
12. **Have you purchased from any of our advertisers in the magazine within the last 6 months?** ☐No ☐Yes, Software ☐Yes, Peripherals ☐Yes, Books ☐Yes, Blank tapes & disks ☐Yes, Furniture, dust covers & accessories
13. **About how much money have you spent on the above purchases?** ☐less than $25 ☐$25-50 ☐$51-100 ☐$101-250 ☐$251-500 ☐$501-1000 ☐over $1000
14. **On the average, about how many program listings in each issue do you key into your computer and use?** ☐None ☐1 ☐2 or 3 ☐4 or more

THANK YOU

Detach, fold and mail. See other side for instructions.

PLEASE HELP

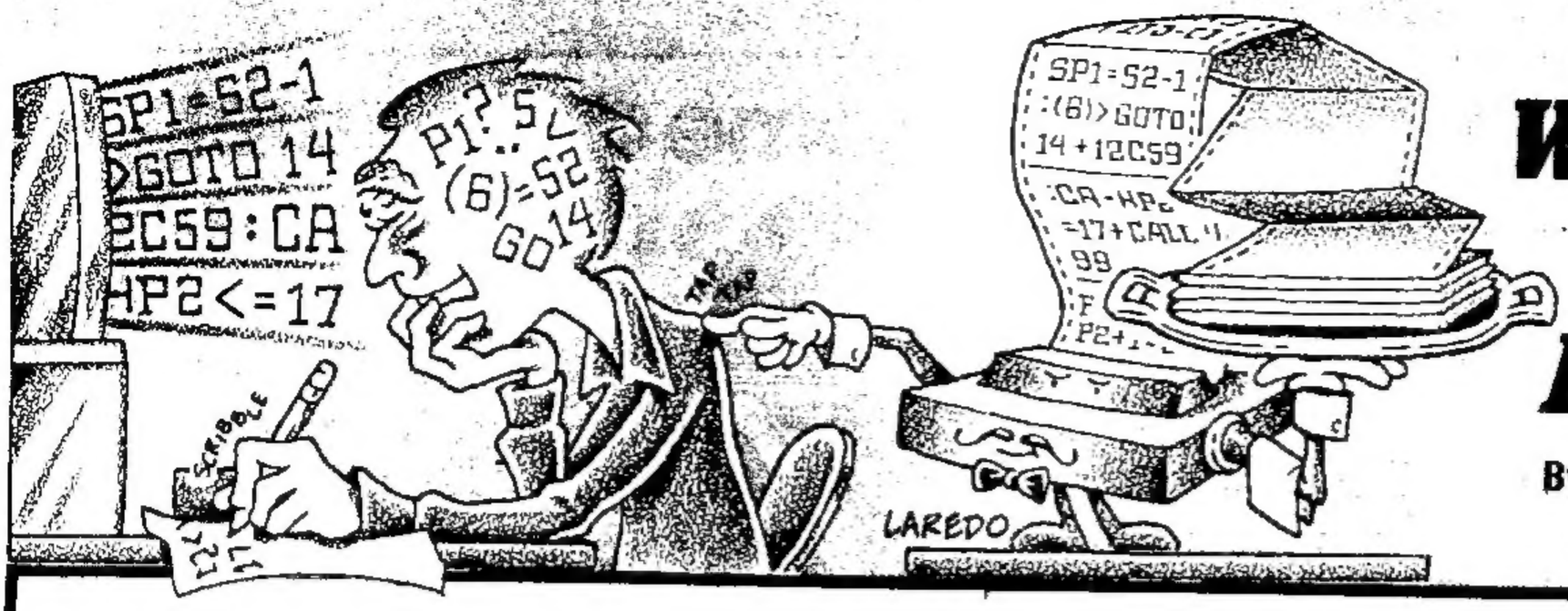


B.A.R.C.* BACK

*(Best Article—Reader's Choice)

Let us know what you like by voting for your favorite article or program in this issue. The winning author will receive a bonus of $100.00

	Page	Article	Author
☐	9	Who Needs a Printer?!	Ehninger
☐	11	Printers on Review	Balthrop
☐	22	Tower of Hanoi	Holl
☐	25	Joys of Adventuring	Pincus
☐	30	Lifeline to Titan	Bill Bies
☐	30	Night Blockade	Reigo
☐	27	Chuck-A-Luck	Pincus
☐	47	Vectors in LOGO	Richard Bies
☐	49	Daisies	Kirchner
☐	56	ASPIC	Berner and Martin



Who Needs A Printer?!

By Charles M. Ehninger
408 Flaxseed Lane
Forth Worth, TX 76108

The latest printers have a wide range of features and capabilities and they offer you innumerable benefits. For example:

- Program listings and data reports are easier to read on paper than on display screens.
- "Hard copy" protects you against data losses caused by equipment failure or power outages.
- Payroll checks and mailing labels can be printed straight from your computer list.

If you still need convincing, consider this: Why are your eyes bloodshot, and your cuffs and shirttails scribbled upon with program line numbers, page references, file names, and other details?

Now—*Who* needs a printer?

The *printed* word is a tangible and dependable medium for information. Once information is down on paper, you can do a great deal with it: analyze it and make corrections, communicate with another person, or file it away—knowing it will be there when you need it, next week or next year.

Printed information also has character. You can feel its texture and weight. Whether it be newsprint, computer printout, or slick magazine stock, the paper itself contributes to the impression conveyed.

Finally the *printed* word has authority. Ideas, agreements, calculations, and descriptions become *documents* when printed. *Printed* words will not rearrange themselves, change meaning, or dissolve into gibberish. This cannot be said for oral communication (nor for some computer programs).

Adding a printer to your Home Computer system provides you with the benefits of the *printed* word. Information is transformed from bytes and pieces into a tangible document you can scrawl on, mail to friends, or rip into shreds. This article will focus on printers that are affordable, available, and intended for use with personal computers—the kind you will find at computer stores. We are not going to discuss printers that cost more than $1000, build-it-yourself printers, laser printers, or ink-jet printers. Some of those excluded may be interesting to read about, but we must be practical.

That leaves us with two types of printers: (1) dot-matrix impact, and (2) daisy-wheel.

Choosing a Printer

The differences between printers are significant—perhaps more so than the differences between computers. Software can mask discrepancies between computers, but not between printers. Think of it this way: In selecting a printer, you are choosing a set of limitations. Sound negative? Well, nobody yet has invented the universal, all-purpose, unlimited printer—and if someone does, who'll be able to afford it? So choose your limitations carefully.

What is important to you? Decide on your top priority first.

- quality of printing type
- printer speed
- cost
- special capabilities such as graphics or plotting

There is a definite trade-off between speed and quality of printing. Rather than compromise, some manufacturers offer two modes in a single printer: one creates well-defined characters but is relatively slow; the other is much faster, but less readable and appealing.

If you plan to use your printer for word processing—business letters, reports, manuscripts, newsletters, and other reading matter—quality of printing should be a top priority.

For data processing—lengthy accounting documents, inventories, program listings, and other high-volume material—you should get the fastest printer you can afford. A slow one can turn out to be a "printer's devil," tying up your computer and keeping you from your work.

For your personal record keeping, program development, and informal word processing, cost will probably be the primary factor.

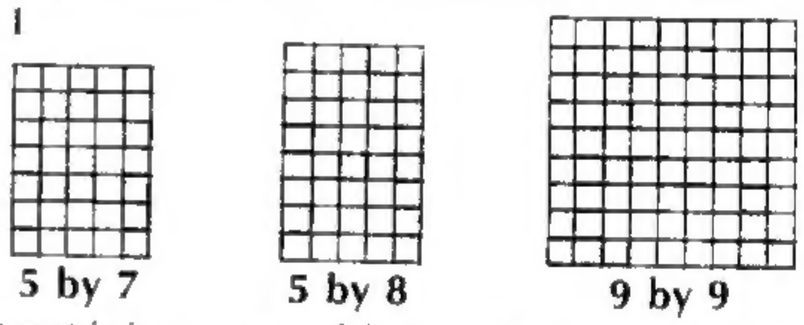
When looking at printers, ask two questions:

1. Does it print dot-matrix or fully-formed characters?
2. Does it use plain or special paper?

What's a Dot Matrix

Dot-matrix characters are made up of dots. The amount of detail in each character is limited by the density of its matrix. (See Figure 1, below, for further explanation.)

Figure 1



A dot matrix is a pattern of dot positions. For example, a sheet of graph paper can be considered a very dense dot matrix. Dense means there are a lot of dot positions on it, allowing a great deal of detail in each character. The most common dot matrix is 5×7. That's 5 columns, each containing seven dot positions. Figure 1 above compares the letter "A" at three different dot densities. (5 by 7, 5 by 8, 9 by 9)

Most plain-paper printers transfer characters onto the page by striking an ink ribbon against the paper. For this reason they are called *impact* printers. Special-paper printers use other means such as heat, electrical current, or chemical action.

Dot-matrix impact printers are the most versatile and popular group. Most recent models have several character styles and sizes, including high-density matrices of up to 9 by 9. Some can even plot points and create high-resolution graphics.

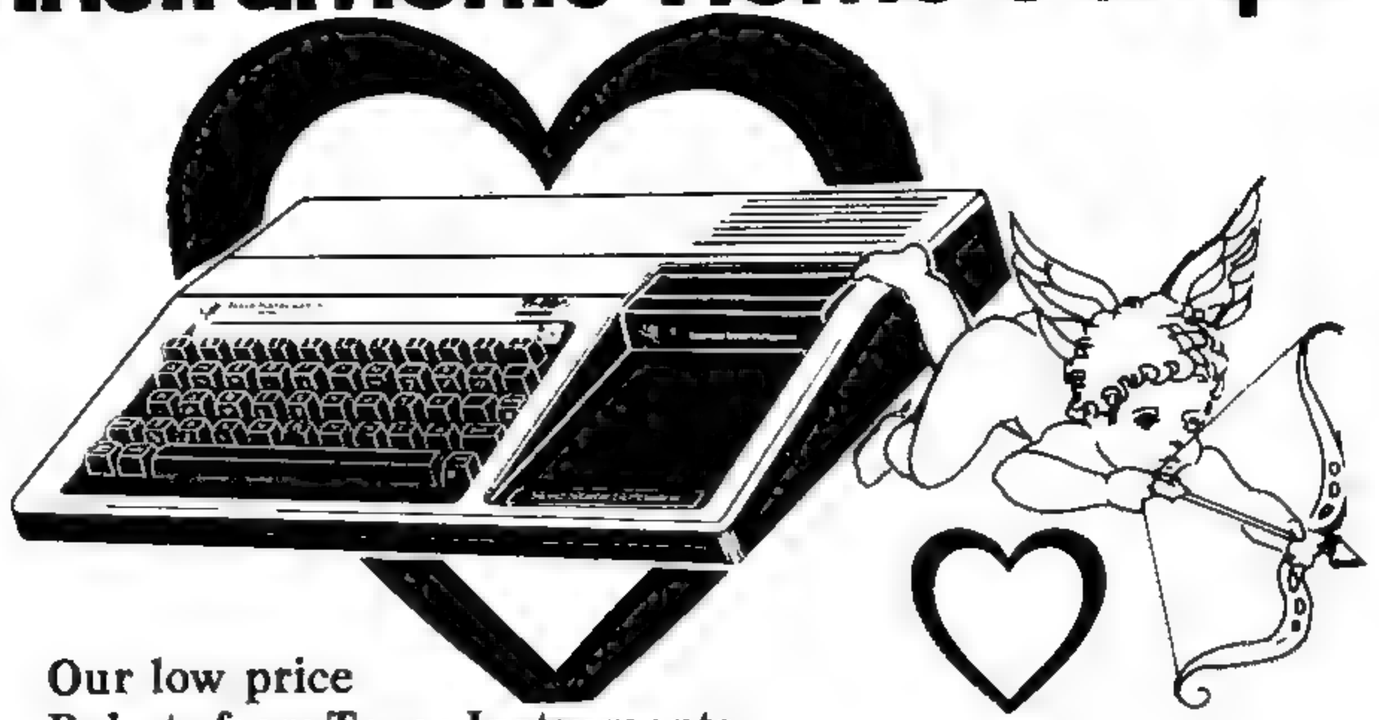
Generally, dot-matrix characters are not as easy, nor as pleasing to read as fully-formed characters. However, some recent units have a letter-quality mode in which the dots overlap to approximate fully-formed characters. Dot-matrix printers are fast, ranging from 50 to 180 characters per second (cps), and range in price from under $400 to well over $2000. With their wide range of prices and capabilities, dot-matrix printers can be considered for almost any data processing, word-processing, or home use.

Daisy-Wheeling

Daisy-wheel printers produce fully-formed characters as clear and crisp as those of typewriters. Fully-formed characters, con-

Continued on p. 16

Texas Instruments Home Computer



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TI-994A has easy-to-program high resolution graphics and 16 colors.

- **You love to sing and you want to program your own accompaniment.**
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- **You want to learn to type...to spell...to play bridge...to teach your child to read...to get faster and better in math...**
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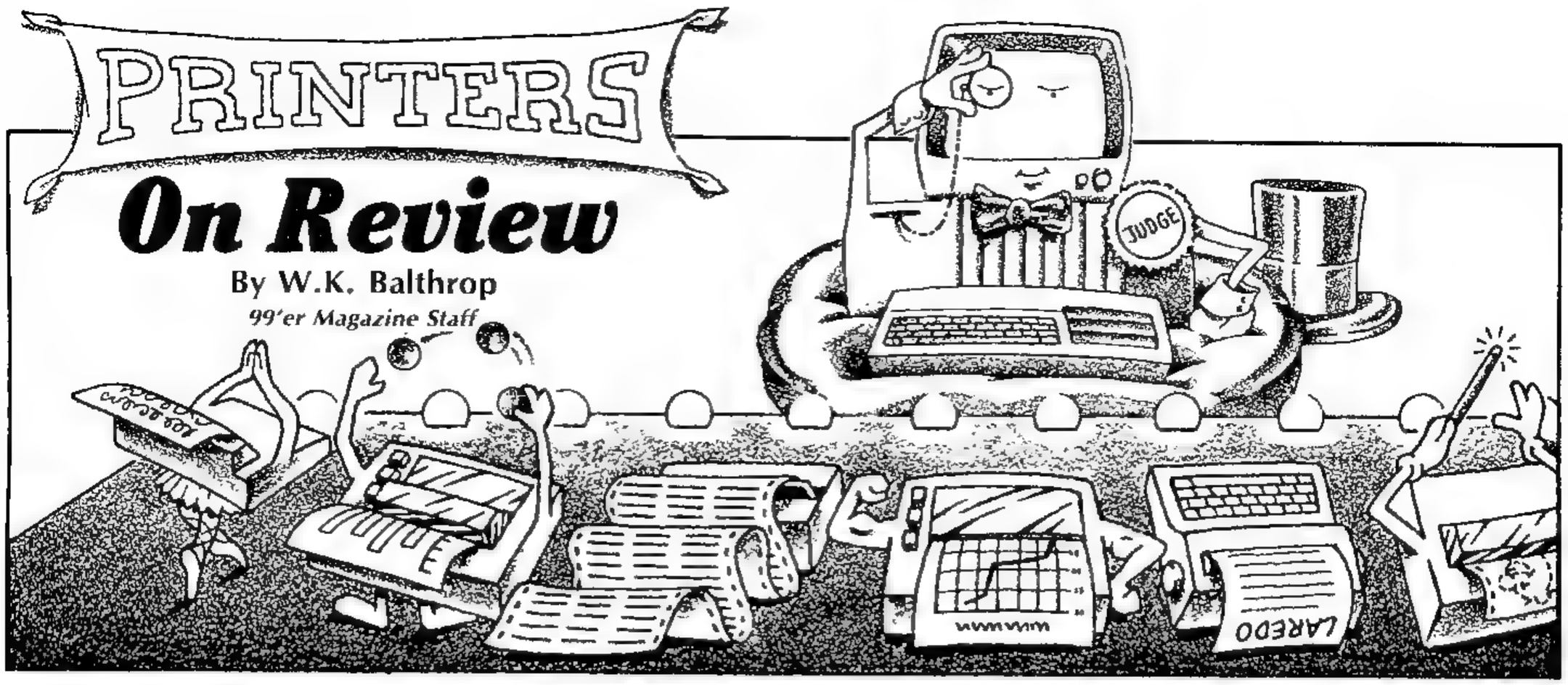
PRINTERS

On Review

By W.K. Balthrop
99'er Magazine Staff



If we were to review all the printers on today's market, we would end up writing a massive book, and by the time we were done, it would need complete revision.

As a practical overview, we have selected five models whose combined features will give you a good idea of what is available in printers at this time.

If you are a newcomer to the realm of printers, I suggest reading *Who Needs a Printer?!* by Charles Ehninger on page 9 of this issue. It will help you understand many of the terms used in the following reviews.

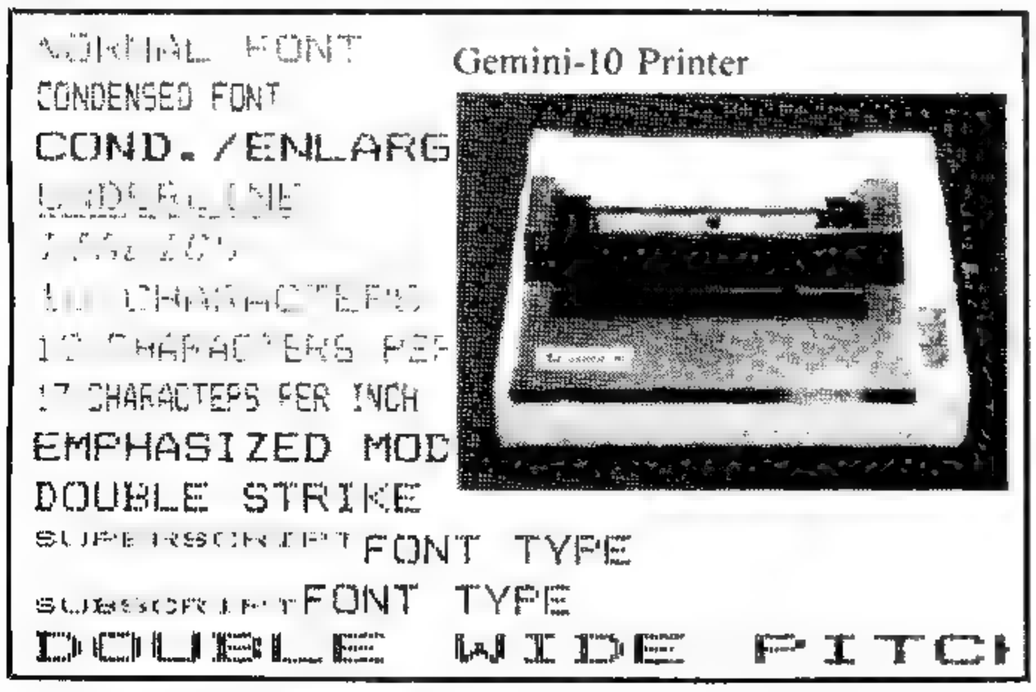
Gemini-10

The Gemini-10 by Star Micronics is an 80 column dot-matrix printer, with bidirectional logic-seeking head positioning, and speeds of up to 100 characters per second. The standard model comes with a parallel interface, 2.3K buffer, and dot-graphics. An RS232 interface with 4K buffer, and RS232 cable are available as options. The standard unit's suggested retail price is $499.00.

Special Features

The Gemini-10 has some features usually found only on more expensive printers. There are 9 type-styles available. Most printers of the Gemini-10 price range include *normal, condensed, enlarged, emphasized,* and sometimes *double strike* as the only available fonts. But the Gemini-10 comes with all of these plus *elite, italics, super-scripts,* and *sub-scripts.* There are also 64 special and foreign characters, and 32 block and line drawing characters. Optional is a 2K user-programmable ROM (Read Only Memory) for a special set of 96 *proportional* characters. The *proportional* characters are of varying widths, like those in this text. For example a small "f" takes up 5 horizontal dot positions, while the letter "W" takes up 15 dot positions.

The standard type-styles available on the Gemini-10 are as follows:



Gemini-10 Printer

The Gemini-10 measures 15.2" × 12.4" × 5.3", and weighs 15.4 pounds. Both friction-feed and tractor-feed are standard. In addition to its ability to use single sheets and fan fold paper, the printer comes with a holder for roll paper. Access to the interior of the printer is simple. Only two screws hold the two outer housings together. The only reason for opening the printer is to access the miniature slide switch set for the optional RS232 interface. All other miniature switch settings are exposed at the back of the printer. This greatly reduces the chance of accidental breakage or electrical shock, should you forget to turn off the power.

In order to connect the Gemini-10 to the TI-99/4A computer, you will need to alter the RS232 cable connecting the printer to the TI RS232 interface card. The wires to pins 11 and 20 must be interchanged on one end, or the computer will keep writing to the Gemini-10 even after the buffer is full—leading to lost data.

Graphics

The Gemini-10 lets you create graphics in three ways. The first is with a set of line drawing and block characters residing in the printer's memory. There are also two dot-graphics modes. Normal density dot-graphics can print up to 480 dots horizontally on one line. In the double-density mode, up to 960 dots can be printed on a single line.

Documentation

Because the Gemini-10 was recently introduced, we were able to get only the preliminary manuals. However, if these are any indication of the final product, users will not be disappointed.

PrintMate™ 99

The PrintMate 99 from Micro Peripherals, Inc. is an 80-column bidirectional dot-matrix printer, capable of printing up to 100 characters per second. The suggested retail price for the unit is $695.00. [Note: MPI also makes a larger model, the PrintMate 150, which offers a wider carriage, larger buffers, higher speed, and down-loadable customized fonts. The 4 versions of this printer have suggested retail prices beginning at $995.00.]

Special Features

The PrintMate 99 comes with a low-speed RS232 interface that has a maximum transmission rate of 1200 bps. An optional RS232 with speeds up to 9600 bps is also available.

Both friction-feed and tractor-feed come as standard equipment. In addition, there are three ways to feed paper into the printer. Fanfold paper can come in from the back of the printer, or it can feed up from the bottom through a special desk top with a slot. Roll paper can be fed from the back with an optional roll-handling bar. Single sheets can be fed into the optional tray at the front of the printer.

On the front are three push buttons and two indicator lights. Pushing the button marked *Select* puts the printer *on-line* —ready to accept data from the computer. The *TOF set* button will set the present position of the paper as the top of form. The *paper advance* button serves two functions: Pressing it quickly advances the paper one line; holding it down advances the paper to the top of the next page. The two indicaters let you know when the power is on and when the printer is in on-line mode.

You can gain access to the control board for setting up the printer options by removing four screws from the bottom hous-

Continued on p. 14

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TEXAS INSTRUMENTS
INCORPORATED

Model		Name	Mfr. Sugg. Ret.	Elek-Tek Price
CONSOLE				
PHC	0046	TI-99/4A Home Computer (incl. RF Modulator)	525.00	300.00
PERIPHERALS				
PHP	1200	Peripheral Expansion Box	249.95	180.00
PHP	220	RS-232 Card	174.95	130.00
PHP	240	Disk Controller Card (One Disk Manager module packed with each Disk Controller)	249.95	180.00
PHP	250	Expansion System Disk Drive (Disk Drive Controller required)	399.95	285.00
PHP	1260	Memory Expansion Card (32K RAM)	299.95	215.00
PHP	270	P-Code Card (32K RAM Memory Expansion required)	249.95	180.00
PHP	1500	Solid State Speech™ Synthesizer	149.95	110.00
PHP	1600	Telephone Coupler (Modem)	224.95	163.00
PHP	2500	TI 80 Column Impact Printer	750.00	500.00
PHP	2300	VCR Controller	699.95	508.00
PHP	2400	P-Code Peripheral	399.95	290.00
PHA	2 00	R.F. Modulator TV Adapter	49.95	36.00
PHA	4 00	0 Color Monitor	399.95	320.00
OPTIONAL ACCESSORIES				
PHP	1100	Wired Remote Controllers (Pair)	34.95	28.00
PHA	1950	Thermal Paper (2 Pack)	9.95	8.00
PHA	2000	Dual Cassette Cable	14.95	12.00
PHA	20 0	Monitor Cable	19.95	15.00
PHA	2020	Audio Adapter (Headphone Jack)	19.95	15.00
PHA	23 0	Panasonic VCR Controller Cables	99.95	85.00
PHA	2320	Sony Video Controller Cables	99.95	85.00
PHA	2330	Pioneer Video Controller Cables	99.95	85.00
APPLICATION PROGRAMS				
Home Management/Personal Finance				
		Command Modules		
PHM	3006	Home Financial Decisions	29.95	24.00
PHM	3007	Household Budget Management (Data storage system is required)	39.95	32.00
PHM	30 2	Securities Analysis	54.95	44.00
PHM	30 3	Personal Record Keeping (Data storage system is recommended)	49.95	40.00
PHM	30 6	Tax/Investment Record Keeping (Disk system is recommended)	69.95	56.00
PHM	3022	Personal Real Estate (Data storage system is recommended)	69.95	56.00
PHM	3044	Personal Report Generator (Data storage system is recommended)	49.95	40.00
PHM	3 11	TI Writer (32K Memory Expansion required)	99.95	76.00
PHM	31 3	Microsoft™ Multiplan ** (32K Memory Expansion required)	99.95	75.00
		Diskette		
PHD	500	Mailing List	69.95	56.00
PHD	5003	Personal Financial Aids	19.95	16.00
PHD	5021	Checkbook Manager	19.95	16.00
PHD	5022	Business Aids Library—Finance Management (Extended BASIC Command Module is required)	39.95	32.00
PHD	5024	Business Aids Library—Inventory Management (Personal Record Keeping or Statistics Command Module is required)	69.95	56.00
PHD	5027	Business Aids Library—Invoice Management (Personal Record Keeping or Statistics Command Module is required)	69.95	56.00
PHD	5028	Business Aids Library—Cash Management (Extended BASIC Command Module is required)	39.95	32.00
PHD	5036	Business Aids Library—Lease/Purchase Decisions	69.95	56.00
		Cassette		
PHT	6003	Personal Financial Aids	14.95	12.00
PHT	6038	Business Aids Library—Lease/Purchase Decisions	59.95	45.00
Educational/Personal Enrichment				
		Command Modules		
Texas Instruments Packages				
PHM	3002	Early Learning Fun	29.95	24.00
PHM	3003	Beginning Grammar	29.95	24.00
PHM	3004	Number Magic	19.95	16.00
PHM	3005	Video Graphs	19.95	16.00
PHM	3008	Video Chess	69.95	56.00
PHM	30 0	Physical Fitness	29.95	24.00
PHM	3020	Music Maker (Data storage system is recommended)	39.95	32.00
PHM	3021	Weight Control and Nutrition (Data storage system is recommended)	59.95	48.00
PHM	3040	TI LOGO (Memory Expansion is required)	129.95	75.00
PHM	3064	Touch Typing Tutor (Available for TI-99/4A only)	39.95	32.00
PHM	3109	TI Logo II (32K Memory Expansion is required)	29.95	75.00
Scott Foresman Reading and Math Packages (Developed by Scott, Foresman)				
PHM	3015	Early Reading (Solid State Speech™ Synthesizer is required)	54.95	44.00
PHM	3043	Reading Fun (Solid State Speech™ Synthesizer is recommended)	54.95	44.00
PHM	3046	Reading On	54.95	44.00
PHM	3047	Reading Roundup	54.95	44.00
PHM	3048	Reading Rally	54.95	44.00
PHM	3082	Reading Flight	54.95	44.00
PHM	3027	Addition and Subtraction I (Solid State Speech™ Synthesizer is recommended)	39.95	32.00
PHM	3028	Addition and Subtraction II (Solid State Speech™ Synthesizer is recommended)	39.95	32.00
PHM	3029	Multiplication I (Solid State Speech™ Synthesizer is recommended)	39.95	32.00
PHM	3049	Division I (Solid State Speech™ Synthesizer is recommended)	39.95	32.00
Scholastic Packages (Developed by Scholastic, Inc.)				
PHM	3059	Scholastic Spelling—Level 3 (Solid State Speech™ Synthesizer is required)	59.95	48.00
PHM	3060	Scholastic Spelling—Level 4 (Solid State Speech™ Synthesizer is required)	59.95	48.00
PHM	3061	Scholastic Spelling—Level 5 (Solid State Speech™ Synthesizer is required)	59.95	48.00
PHM	3062	Scholastic Spelling—Level 6 (Solid State Speech™ Synthesizer is required)	59.95	48.00
Addison-Wesley Computer Math Games (Developed by Addison-Wesley Publishing Co.)				
PHM	3083	Computer Math Games II	39.95	32.00
PHM	3088	Computer Math Games VI	39.95	32.00
Milliken Home Math Series—K thru 8th grade (Developed by Milliken Publishing Co.)				
PHM	3090	Addition*	39.95	32.00
PHM	3091	Subtraction*	39.95	32.00
PHM	3092	Multiplication*	39.95	32.00
PHM	3093	Division*	39.95	32.00
PHM	3094	Integers*	39.95	32.00
PHM	3095	Fractions	39.95	32.00
PHM	3096	Decimals	39.95	32.00
PHM	3097	Percents*	39.95	32.00
		Diskette		
Texas Instruments Packages				
PHD	5007	Teach Yourself BASIC	34.95	28.00
PHD	5009	Music Skills Trainer	29.95	24.00
PHD	50	Computer Music Box	9.95	16.00
PHD	50 8	Market Simulation	9.95	16.00
PHD	50 9	Teach Yourself Extended BASIC (Extended BASIC Command Module is required)	24.95	20.00
PHD	5020	Music Maker Demonstration (Music Maker Command Module is required)	14.95	12.00
PHD	5023	Basketball Statistics (Extended BASIC Command Module is required)	24.95	20.00
PHD	5026	Bridge Bidding I	29.95	24.00
PHD	5030	Speak & Spell™ Program (Solid State Speech™ Synthesizer is required)	29.95	24.00
PHD	503	Speak & Math™ Program (Solid State Speech™ Synthesizer and Terminal Emulator II are required)	29.95	24.00
PHD	5039	Bridge Bidding II	29.95	24.00
PHD	504	Bridge Bidding III	29.95	24.00
PHD	5042	Speller Writer (Terminal Emulator II Command Module and Solid State Speech™ Synthesizer are required)	29.95	24.00
PHD	5067	Beginner's BASIC Tutor	29.95	24.00
MECC Packages (Developed by Minnesota Educational Computing Consortium)				
PHD	5078	Metric and Counting (Extended BASIC Command Module is required)	29.95	24.00
PHD	5079	Elementary Economics	29.95	24.00
PHD	5080	Elementary Math and Science (Extended BASIC Command Module is required)	29.95	24.00
PHD	508	Astronomy (Extended BASIC Command Module is required)	29.95	24.00
PHD	5082	Word Beginnings* (Extended BASIC Command Module is required)	29.95	24.00
PHD	5083	Exploring* (Extended BASIC Command Module is required)	29.95	24.00
PHD	5084	Math Practice (Extended BASIC Command Module is required)	29.95	24.00
PHD	506	Science Facts* (Extended BASIC Command Module is required)	29.95	24.00

Available ... Fourth Quarter 1982
* Developed by Scott, Foresman
** Developed by Milton Bradley—The Attack, Blasto, Hustle, ZeroZap, Connect Four and Yahtzee are trademarks of Milton Bradley
*** Developed by Microsoft ... Multiplan is a trademark of Microsoft Corp.

Model		Name	Mfr. Sugg. Ret.	Elek-Tek Price
APPLICATION PROGRAMS CONTINUED				
Education/Personal Enrichment Continued				
PHD	5086	Natural Science (Extended BASIC Command Module is required)	29.95	24.00
PHD	5087	Social Science* (Extended BASIC Command Module is required)	29.95	24.00
PHD	5088	Teacher's Tool Box (Extended BASIC Command Module and printer are required)	29.95	24.00
		Cassette		
PHT	6007	Teach Yourself BASIC	29.95	24.00
PHT	6009	Music Skills Trainer	24.95	20.00
PHT	6011	Computer Music Box	14.95	12.00
PHT	6018	Market Simulation	14.95	12.00
PHT	6019	Teach Yourself Extended BASIC (Extended BASIC Command Module is required)	19.95	16.00
PHT	6026	Bridge Bidding	24.95	20.00
PHT	6031	Speak & Math™ Program (Solid State Speech™ Synthesizer and Terminal Emulator II are required)	24.95	20.00
PHT	6039	Bridge Bidding II	24.95	20.00
PHT	604	Bridge Bidding III	24.95	20.00
PHT	6042	Spell Writer (Terminal Emulator II Command Module and Solid State Speech™ Synthesizer are required)	24.95	20.00
PHT	6067	Beginner's BASIC Tutor	24.95	20.00
Entertainment				
		Command Modules		
Texas Instruments Packages				
PHM	3009	Football	29.95	24.00
PHM	3018	Video Games	29.95	24.00
PHM	3023	Hunt the Wumpus	24.95	20.00
PHM	3024	Indoor Soccer	29.95	24.00
PHM	3025	Mind Challengers	24.95	20.00
PHM	3030	A Maze-ing	24.95	20.00
PHM	3052	Tombstone City 21st Century	39.95	32.00
PHM	3053	TI Invaders	39.95	32.00
PHM	3054	Car Wars	39.95	32.00
PHM	3057	Munch Man	39.95	32.00
PHM	3042D	Tunnels of Doom (2 Diskette Games included)	59.95	45.00
PHM	3042T	Tunnels of Doom (2 Cassette Games included)	59.95	45.00
PHM	3056	Alpiner	39.95	32.00
PHM	31 0	Chisholm Trail	39.95	32.00
PHM	31 2	Parsec	39.95	32.00
Milton Bradley Packages (Developed by Milton Bradley Company)				
PHM	3031	The Attack††	39.95	32.00
PHM	3032	Blasto††	24.95	20.00
PHM	3033	Blackjack and Poker††	24.95	20.00
PHM	3034	Hustle††	24.95	20.00
PHM	3036	ZeroZap††	19.95	16.00
PHM	3037	Hangman††	19.95	16.00
PHM	3038	Connect Four††	19.95	16.00
PHM	3039	Yahtzee††	24.95	20.00
Adventure International Packages (Developed by Scott Adams)				
PHM	304 D	Adventure (Pirate Adventure Diskette Game included)	49.95	40.00
PHM	304 T	Adventure (Pirate Adventure Cassette Game included)	49.95	40.00
Gabriel Industries Packages (Developed by Gabriel Industries)				
PHM	3067	Othello* (Developed by Gabriel Industries)	39.95	32.00
		Diskette		
Texas Instruments Packages				
PHD	5007	TI Trek (with optional speech)	14.95	12.00
PHD	5010	Mystery Melody	14.95	12.00
PHD	5015	Oldies But Goodies—Games I	19.95	16.00
PHD	5017	Oldies But Goodies—Games II	24.95	20.00
PHD	5025	Saturday Night Bingo (Solid State Speech™ Synthesizer is required)	29.95	24.00
PHD	5037	Draw Poker (Extended BASIC Command Modules is required)	24.95	20.00
PHD	5057	Tombstone City 21st Century (32K Memory Expansion and Extended BASIC Command Module are required)	19.95	18.00
PHD	5058	TI Invaders (32K Memory Expansion and Either Extended BASIC or Editor Assembler Command Module are required)	9.95	16.00
PHD	5060	Munch Man (32K Memory Expansion and Either Extended BASIC or Editor Assembler Command Module are required)	19.95	16.00
Adventure International Adventure Series (Developed by Scott Adams) (PHM 3041D required)				
PHM	5046	Adventureland	29.95	24.00
PHD	5047	Mission Impossible	29.95	24.00
PHD	5048	Voodoo Castle	29.95	24.00
PHD	5049	The Count	29.95	24.00
PHD	5050	Strange Odyssey	29.95	24.00
PHD	5051	Mystery Fun House	29.95	24.00
PHD	5052	Pyramid of Doom	29.95	24.00
PHD	5053	Ghost Town	29.95	24.00
PHD	5054	Savage Island I & II	39.95	32.00
PHD	5056	Golden Voyage	29.95	24.00
		Cassette		
Texas Instruments Packages				
PHT	6010	Mystery Melody	9.95	8.00
PHT	6015	Oldies But Goodies—Games I	14.95	12.00
PHT	6017	Oldies But Goodies—Games II	19.95	16.00
PHT	6025	Saturday Night Bingo (Solid State Speech™ Synthesizer is required)	24.95	20.00
PHT	6037	Draw Poker	19.95	16.00
Adventure International Adventure Series (Developed by Scott Adams) (PHM 3041T required)				
PHT	6046	Adventureland	29.95	24.00
PHT	6047	Mission Impossible	29.95	24.00
PHT	6048	Voodoo Castle	29.95	24.00
PHT	6049	The Count	29.95	24.00
PHT	6050	Strange Odyssey	29.95	24.00
PHT	6051	Mystery Fun House	29.95	24.00
PHT	6052	Pyramid of Doom	29.95	24.00
PHT	6053	Ghost Town	29.95	24.00
PHT	6054	Savage Island I & II	39.95	32.00
PHT	6056	Golden Voyage	29.95	24.00
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		Command Modules		
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PHM	30	Speech Editor (Solid State Speech™ Synthesizer is required)	44.95	36.00
PHM	3014	Statistics (Data storage system is recommended)	44.95	36.00
PHM	3026	Extended BASIC	99.95	75.00
PHM	3035	Terminal Emulator	49.95	40.00
PHM	3055	Editor/Assembler	99.95	80.00
PHM	3058	Mini Memory (4K)	99.95	80.00
PHM	3045D	SMU Electrical Engineering Library (12 Diskettes included)	149.95	120.00
PHM	3045T	SMU Electrical Engineering Library (10 Cassettes included)	149.95	120.00
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PHD	5004	Programming Aids I	4.95	12.00
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PHD	5006	Math Routine Library	29.95	24.00
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PHD	5061	UCSD-PASCAL Compiler (32K Memory Expansion and P-Code required)	24.95	100.00
PHD	5064	UCSD p-System Assembler/Linker (32K Memory Expansion and P-Code required)	99.95	80.00
PHD	5065	UCSD p-System Editor/Filer/Utilities (32K Memory Expansion and P-Code required)	4.95	60.00
PHD	5066	TI PILOT (32K Memory Expansion and P-Code required)	79.95	60.00
PHD	5068	Course Designer Authoring Package (Extended BASIC required and Video Controller optional)	49.95	150.00
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		Cassette		
PHT	6004	Programming Aids I	9.95	8.00
PHT	6006	Math Routine Library	24.95	20.00
PHT	6008	Electrical Engineering Library	24.95	20.00
PHT	60 3	Graphing Package	4.95	12.00
PHT	60 6	Structural Engineering Library	24.95	20.00
PHT	6044	AC Circuit Analysis	24.95	20.00
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PHL	7002	The Family Entertainer	99.95	65.00
PHL	7003	The Elementary Educator	99.95	75.00
PHL	7004	The Music Educator	64.90	30.00
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PHL	7006	The Speaking Math Teacher	1 9.85	90.00
PHL	7007	The Speaking Reading Teacher	109.90	85.00
PHL	7008	The Speaking Scholastic Spelling Teacher	219.80	160.00
PHL	7009	The TI Arcade Game Series	119.85	90.00
PHL	7010	The Milton Bradley Game Series	114.75	90.00
PHL	70	The Computer Introductory Package	119.85	90.00

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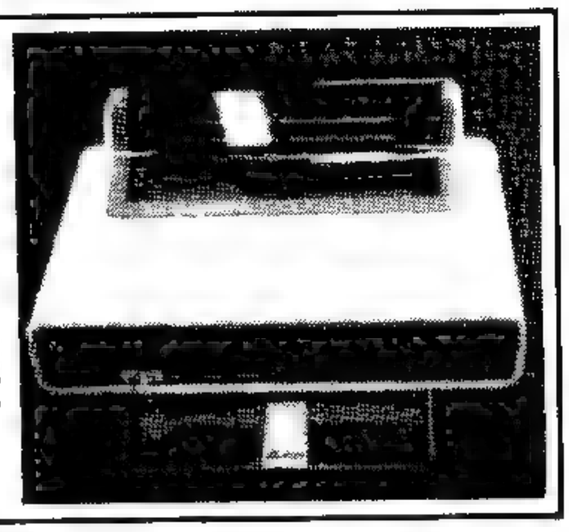
Printers On Review . . . from p.11

ing. The upper housing then lifts off. Inside you will find two miniature slide switch sets. These switches can be used to set up the low-speed RS232 interface, the form length, line spacing to 6 or 8 per inch, and one of four character densities as the default at power up.

Five character types are available:

PrintMate 99™ Printer



If you plan to use the standard low-speed RS232 interface, you will need to change the cable which comes with the printer. On one end of the cable is a 25-pin connector which mates to your TI RS232 interface card in the TI Peripheral Expansion Box. On the other end is a 13-pin connector which you will need to change. The wire connected to pin 10 will have to be removed and placed on pin 4. This will allow the printer to talk back to the computer, telling it when it's O.K. to send information. You may find the arrangement of the connector slightly confusing. It has a *single* row of 13 pins and its mate in the printer has *two* rows of 13 pins. The manual did not specify which set of pins you were to place the cable connector on. After considerable research, I discovered that you place it on the right row of pins (as you are facing the front of the printer) with cable pin #1 at the back.

Graphics

The PrintMate 99 is capable of printing dot-graphics with six of the 9 wires in the print head. Once the graphics mode is set, the patterns are printed with ASCII codes 64 through 127. Four densities are available: 50 dots per inch (dpi); 60 dpi; 75 dpi; and 82.5 dpi.

Documentation

The PrintMate 99 comes with a 60-page reference manual (ours, however, still referred to the older MPI 88) and an abbreviated 6-page reference manual. The manuals are easy to read and informative, except in explaining the hook-up of the RS232 cable. On the back of the 60-page manual is a reference card explaining switch settings and control characters.

TI 99/4 Impact Printer

Texas Instruments recently came out with a low-cost dot-matrix printer for the TI-99/4A Home Computer. This printer is a modified version of Epson's MX-80, and most programs designed for the latter will work with the TI machine. The unit's suggested retail price is $750.00.

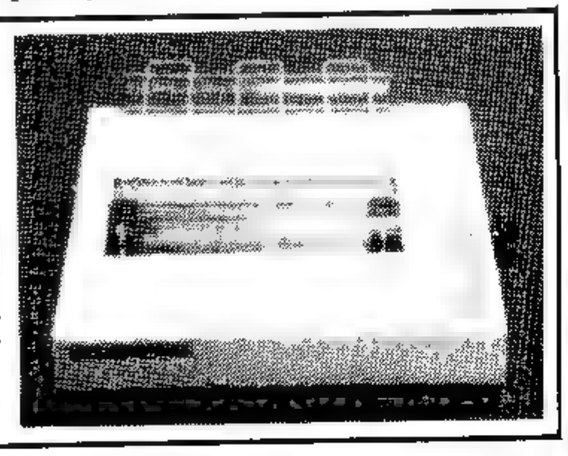
Special Features

In text mode the TI printer is capable of printing 80 characters per second, bidirectionally with logic seeking. In the dot-graphics mode, printing is unidirectional.

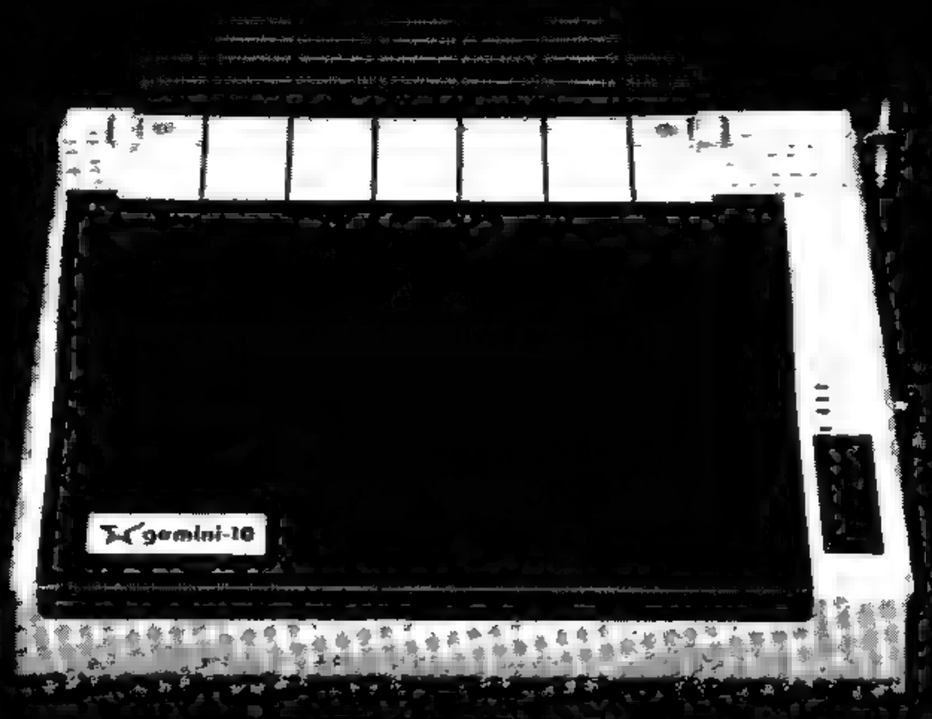
The RS232 interface with 2K buffer, RS232 cable, and dot-graphics comes standard—ready to use.

The TI printer is capable of print densities of 5, 8.25, 10, and 16.5 characters per inch, depending on the style of type being used. There are five basic type-styles.

TI 99/4 Impact Printer



Continued on p. 19



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Who Needs A Printer?! . . . from p.9

sist of solid lines. (The print you are reading in this article is fully formed.) The daisy wheel printer gets its name from the print element which looks like a daisy with type at the tips of its elongated petals. The wheel rotates at high speed and a hammer strikes the appropriate character as it passes by. The print wheels are easily removable and are available in several styles and sizes.

Daisy-wheel printers are slower than dot matrix printers—with speeds ranging from 12 to 55 cps. They also are usually much more expensive—from $1500 to $2000 and up. (Smith-Corona's recent entry into the daisy-wheel market is a superb exception. So is the specially modified Olivetti PRAXIS typewriter.) For top quality word processing, you can't beat a daisy-wheel printer.

Is It Computer Compatible?

You are almost ready for that shopping trip, but first you need to know about a little thing called an *interface*.

Before your computer can begin communicating with a printer the two units must be connected. That seems obvious, but there's a lot more to it than simply connecting a bunch of wires. There are matters of voltage levels, timing, and protocol (which device says "hello" first). All of these items are handled by the *interface*.

There are two major interface types for computer-printer communications: serial and parallel. The RS-232 card (TI PIP1220) for the TI-99/4A accommodates both. [If you use a serial port on the RS-232 card, the parallel interface will be open to future peripherals you may want to connect, but you'll have to make sure the printer you buy also has an RS-232 interface installed—often an option at extra expense.—Ed.] Be sure to buy a cable specifically designed for the interface you select.

Evaluating Printers

Okay. You are in the computer store. You have determined what kind of printer you are interested in—one you know is compatible with your TI-99/4A. How do you compare one printer with another? We shall list the features to look for and offer some suggestions on weighing one against anotner.

Printer Speed

Printer *speed* is given in characters per second (cps) or lines per minute (lpm). Most printers in the personal computer market specify cps. Printers that output an entire line at once (or appear to do so) use lpm.

One 8½-by-11-inch page of double-spaced text contains approximately 1800 characters. A 30 cps printer does a page in one minute, or 30 pages in half an hour. A 150 cps printer does a page in 12 seconds, or 30 pages in six minutes. (But remember when you are waiting for a printout, *apparent time* seems like twice the actual time!)

After you have determined the speed, look for features that make the most of that speed—or in computer lingo, increase the printer's *throughput*. Bi-directional printing is one example. The printer outputs one line from left to right, the next from right to left, then left to right, and so forth. This minimizes the time the print-head must move without actually putting the characters on the page.

Logic seeking is another wrinkle in the speed game. It means that a printer can go directly to the first actual print position on the next line—not starting at the extreme left or right margin. Put the last two features together and you have a bidirectional, logic-seeking printer. If that doesn't impress your friends, nothing will.

In normal text, there is a lot of white space—paragraph indents, tabulations, double-spacing, and spacing at the top and bottom of pages. Some printers can *logically sum* the number of characters that produce blank spaces. For example, using logically-summed spaces, a printer will do a paragraph indent in one continuous motion, rather than going one space at a time. Using logically-summed line feeds, a printer can skip six lines in a continuous motion, rather than in six separate line advances.

Character Styles

Until recently, affordable printers could produce only upper case characters, but the lower case is now available on most units. Many offer a standard set defined by 96 character codes called ASCII (American Standard Code for Information Interchange). An increasing number of dot matrix printers offer graphics and special characters.

Individual character styles vary widely and are subject to your own taste. However, one detail deserves attention here—*lower case descenders*. Descenders are the tails on the letters g, j, p, q, and y. Normally, these drop below the baseline of the other letters. But in many lower-density, dot matrix printers the descenders are not "true," i.e., the letter is raised so the descender rests on the baseline. If you find this annoying, look for a printer with true descenders.

You should also consider the *character sizes* available on the printer. Measured in characters per inch (cpi), standard sizes are 10 (pica), 12 (elite), and 16.5 or 16.7 (condensed). Pica type is standard for data processing and general purposes. Elite is often used in business letters and legal documents. Condensed is useful when you want to pack many characters onto each line, for example, when you need to print 132-column tables on 8-inch lines. Many dot-matrix printers also offer extended characters (5 cpi, 2.5 cpi), which are nice for headings.

Proportional spacing is a useful feature for word processing. The pica, elite and condensed characters are all *monospaced*, meaning each character takes up the same space. With proportional spacing, however, the space used by each character is proportional to its shape. For example, the "i" requires less space than the "m." The text you are now reading is proportionally spaced. This spacing allows more characters per line but does not appear condensed, and is easier on the eyes. For tables, columnated reports, and program listings, monospacing is preferable.

Control Codes

In addition to printing characters, many printers perform a variety of functions under computer control. The most common and useful of these *control codes* are:

- Backspace (allows overstriking for boldface and special effects)
- Tabs (positions are fixed or set by the computer)
- Form feed (automatically advances the paper to the beginning of the next form)
- Separate functions for line feed and carriage return (for special effects and timesaving)
- Bell or tone signal (the only way some systems can get your attention)

Paper

What *size* paper can a printer handle? How many characters will fit on one line of that paper? Printers are often rated in columns per line; this is the same thing as characters per line. Can the printer accept page after page without your assistance, or do you need to feed it one sheet at a time? Ask these questions when shopping for a printer.

If you are looking at impact printers, you'll have more choices in terms of paper size and handling. For word processing, an 8½-inch-wide paper is standard. It allows 80 characters per line at 10 cpi. If the printer has a condensed mode, you can get 132 characters onto one 8-inch line. For data processing in an office environment, some people prefer printers able to handle paper up to 15 inches wide.

Three methods of *paper feed* are available: friction feed (as on typewriters), pin feed, and tractor feed. With friction feed, the paper is in sheets or on a roll. With pin and tractor feed, the paper is continuous and fanfolded, with holes along each margin. Pin-feed systems have guide pins on the ends of the platen; tractor-feed mechanisms are external and often more reliable than pin feed. Some dot-matrix impact printers are equipped with both friction and tractor feed. Many friction-feed daisy-wheel units have optional tractor attachments.

One problem with friction feed is paper alignment. During long runs using rolls or other continuous paper, the paper tends to creep to the left or right. Also there may be some vertical slippage. This may be acceptable in most personal computer applications, but not in repetitive forms printing where margins are critical.

User Communication

One last question: Does the printer talk back to the computer? For example, it it is out of paper or ribbon, will the printer stop to inform the computer of the problem? And when you replenish the paper or ribbon, will the printer continue without losing a

Continued on p. 64

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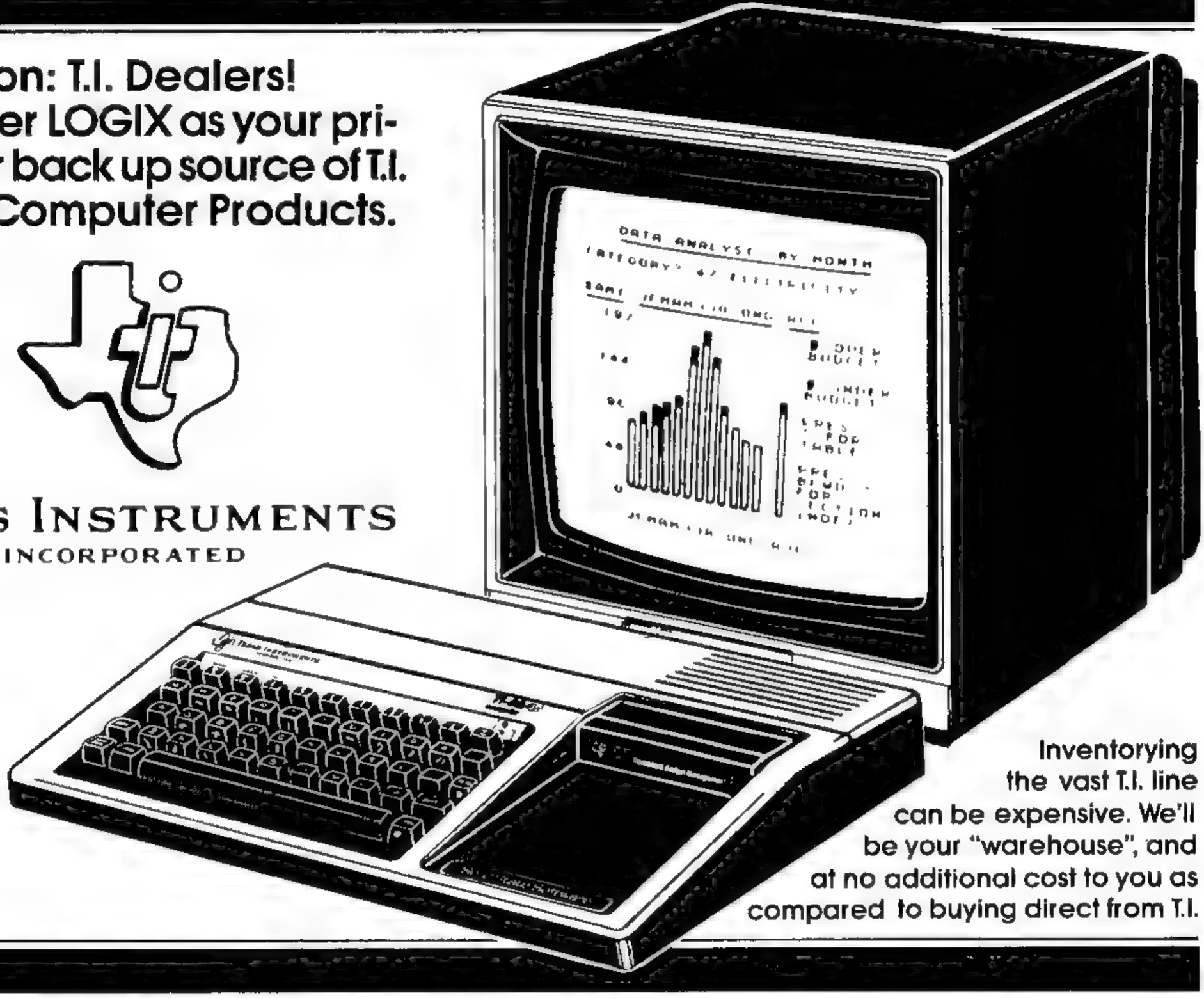

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Printers On Review . . . from p.14

The TI printer measures 4.2" × 14.7" × 12", and weighs 12 pounds. Access to the interior is a simple matter of loosening the four screws holding together the upper and lower housings. Inside are miniature slide switches that let you select form length, line spacing, character type, and several other options to become the default when the printer is powered up. You can also select any one of eight international character sets, and set up the RS232 interface.

Graphics

The TI 99/4 Impact Printer is capable of printing dot-graphics interspersed with text on the same line. Two dot-graphic resolutions are available. Normal-resolution graphics can print up to 480 dots horizontally on one line. Double-resolution graphics can print up to 960 dots per line.

Documentation

The manual for the TI printer is concise and easy to read. As a bonus, TI has included a number of program examples showing how to use each feature of the printer. The novice programmer will find it a valuable tool, as it is designed specifically for use with the TI-99/4A computer.

Microline 83A

The Microline 83A, from Okidata Corp. is a high-quality, wide-carriage printer. Its 136-column bidirectional logic-seeking dot-matrix print head moves along with an impressive print speed of 120 characters per second (cps). The suggested retail price is $899.00.

Special Features

The 83A comes standard with a low-speed serial RS232 interface capable of transmission rates to 1200 bits per second (bps). An optional high-speed RS232 interface can be purchased separately for $120.00, increasing transmission speed to as high as 9600 bps. Friction-feed and tractor-feed both come standard. The friction-feed lets you insert individual sheets, (letterheads or envelopes) whereas the tractor-feed ensures the smooth flow of continuous fanfold paper. It is extremely easy to switch between the two.

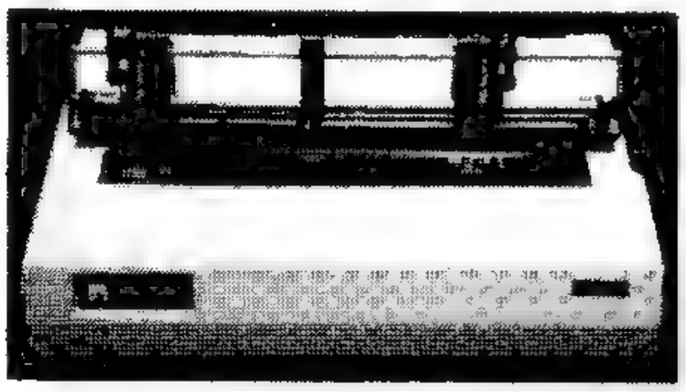
The 83A printer measures 14.21" × 12.91" × 5.24" and weighs 32 pounds. On the front of the printer is the control panel. Most control panels include a "form-feed," "line-feed," and "on-line" switch, but the 83A takes it a step further. It has a rotary 10-position switch to set the form length and another switch to set the paper's present position as the "top of form." This feature saves you from having to power down the printer just to set the "top of form."

Two paper feed paths are available. In addition to the normal feed path—from the back, through the print mechanism, and out the back again—paper can be fed up through the bottom of the printer. Of course a special table or desk top is needed, with a slot in the top for the paper to pass through.

There are four type-styles available with the 83A, each of them software selectable. The printer will always power up with "normal" type. Print densities are 5, 8.3, 10 and 16.5 characters per inch, depending on the type-style used. The 83A will print the following type-styles:

Microline 83A

NORMAL FON
CONDENSED FONT
ENLAR
COND. /
ENLARGED



Access to the control card is easily gained. First remove the tractor-feed system (about a ten-second operation). Under the top cover you will find two Phillips-head screws holding the upper housing to the lower housing. Once these are removed, the upper housing will lift off. You can then get to the two sets of miniature slide switches needed to set up the printer. The first is in the front, on the control panel. Use this one to set up any one of nine international character sets, plus a TRS-80 character set. The other set of switches, in the back of the printer on the control card, will let you set up the RS232 parameters.

Continued on p. 64

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Letters . . . from p. 7

the amount of editorial content, in each issue, against the ease of reading the content.

Dear Sir:
I am totally impressed with your magazine! It not only enhances the TI-99/4A's fantastic capabilities, but it reconfirms what a smart decision I made to purchase this relatively unknown machine.

There is a software program that I cannot find anywhere and maybe you or your readers can assist me. It is a political software program. With all the political groups in America, I am amazed there is not one program available for individual candidates, county chairman, or state committees. There must be a huge market just waiting to be tapped.

Again, congratulations on such a balanced magazine. Texas Instruments 99/4A continues to achieve creditability and grow in demand in part because of your publication.

Robert W. Geddis
Hagaman, NY

Thanks, Bob, for the compliment. Maybe a reader out there in 99'er Land can tell us if such a program exists . . .

Dear Sir:
I have owned a TI-99/4A for well over a year, and I have been following the development of this computer since its inception. I have found that *99'er Magazine* is by far the most informative reading of any of the computer magazines. I have devoured each issue, beginning on the way back from the mailbox. I am overjoyed to see that you have finally gone to a monthly publishing schedule.

When I originally typed in the FORCE 1 program, I made provisions for the use of joysticks, but the suggestion by David Lewis in your November issue looked so intriguing that I added your suggested changes to the program. Unfortunately, the addition will not work as published.

A problem exists that will allow no motion at all. Line 640 does not allow movement if the key status is zero. The joystick routine does not return this value, so S remains set to zero. To solve this problem, change lines 1690, 1700, 1710, 1720 and 1730 as follows:

```
1690 K=88 : : S=1   : RETURN
1700 K=83 : : S=1     RETURN
1710 K=68 : : S=1 : : RETURN
1720 K=69 : : S=1 : : RETURN
1730 K=0 : : S=0 : : RETURN
```

Besides these, there are errors on line number 1680. The ON JZ GOTO . . . statement has its last two arguments reversed. This results in no northward sensing. This statement also lacks an eighth value. This will cause an error if the joystick is moved to the northeast position. To correct both of these problems, re-enter line 1680 as follows:

```
1680 ON JZ GOTO 1730, 1690, 1730, 1700,
1730, 1710, 1730, 1720, 1730
```

After these changes, the FORCE 1 program will operate properly with joysticks as well as the arrow keys.

With the recent boom in TI sales, my dream of organizing a local user's group has materialized. We have named the group, appropriately enough, "The Daytona 99'ers." Each of our last two meetings have drawn about fifty people. If we keep getting this amount of new people every month, there is a great potential here. I would appreciate it if any TI users in the Daytona Beach, Florida area would contact us.

I have many ideas for articles for *99'er Magazine*, and I would like you to send me Author's Guidelines.

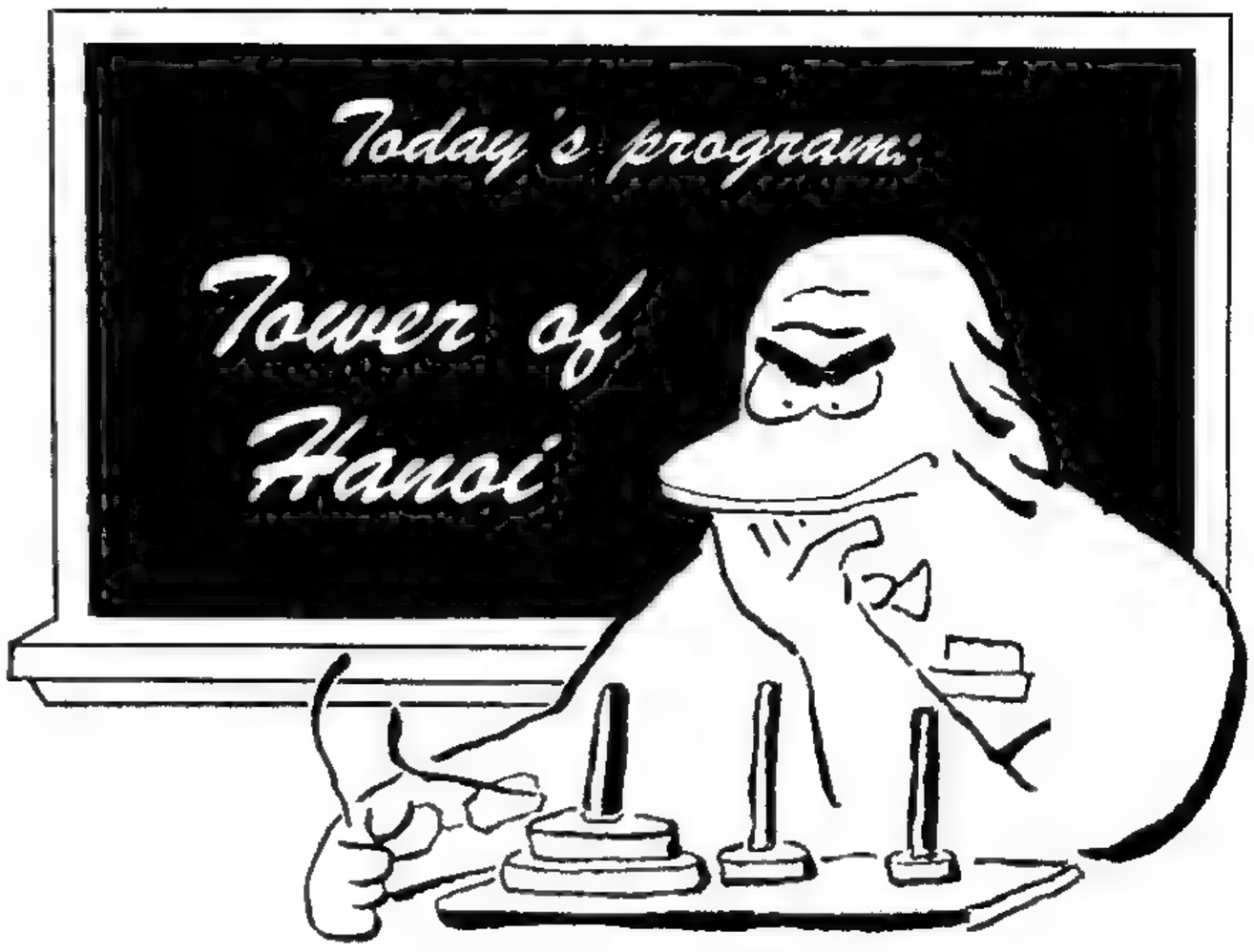
Once again . . . Keep Up The Good Work.

Ralph W. Fowler, III
The Daytona 99'ers
P.O. Box 4596
S. Daytona, FL 32019

Ralph. Thanks for your corrections. Good luck to all The Daytona 99'ers and we look forward to any articles you care to submit.

Professor Holl's Pocket Programs

. . . and problems in programming



By S.T. Holl

Qtrs 327A, Yerba Buena Island
San Francisco, CA 94130

You are in an ancient temple at the center of the earth where three diamond needles bear eighty golden rings of graduated sizes. At the beginning of time the rings were all on one needle; but now the temple monks are transferring the rings, one at a time, from needle to needle, never setting a ring on a smaller ring. When they have moved all eighty rings to one of the other two needles, the world will end . . .

Possibly you have seen a children's toy along these lines—four or five disks of various colors and sizes, drilled to fit on three wooden pegs. The object is to start with the disks on one peg, and by moving one at a time—and never setting a disk on a smaller one—transfer the entire pile to another peg. If you don't have one of these in your closet, here is a pocket program of the puzzle for you and your friends.

When the program is run, four "rings" (they will actually look more like short bars) will appear on the left of the screen. There is room on the screen for three piles of rings. (To make the game pocket-sized, the pegs were left out.) To move a ring from one pile to another, press key 1, 2, or 3 to designate which pile (left, center, or right) to take the ring from, and then press 1, 2, or 3 to designate which pile to move the ring to. That's all there is to it.

The program works this way: rings are represented by the numerals 1, 3, 5, and 7. Peg (1), Peg (2), and Peg (3) are variables in which the presence of rings on the three pegs (or piles) are recorded. Thus in line 200, which is part of the initial setup portion of the program, Peg (1) is given the value 1.357 corresponding to the presence of all four rings on the first peg. The leftmost numeral is the one on top.

At the beginning, pegs #2 and #3 are empty. When a ring is moved from one peg to another, the values of the "peg( )" variables change accordingly. For example, if our first move is to place the top ring from peg #1 onto peg #2, then Peg (1) changes from 1.357 to 3.57 and Peg (2) changes from 0 to 1.

These changes are performed in line 450 (where the "size" of the ring being moved is figured out) and in lines 500 and 510 where the values of the "peg( )"s are actually changed. "From" and "too" identify the pegs. They are given values when the keys 1, 2, or 3 are pressed. The three "top( )" variables are strictly for the graphic display; they record the positions of the tops of the piles on the screen. Conveniently, the rings are 1, 3, 5, and 7 characters wide.

"Status" is used as part of the "call key" routine to tell the machine when a key has been released so that the program can go ahead. Now read through the program and see if you can follow what is happening.

Stacks

The piles of rings in this program are particularly graphic illustrations of the *stack*, a ubiquitous and very important idea in practically every kind of software. Like the rings in these piles, things stored on *software stacks* (subroutine return addresses, interrupts, whatever . . .) come off the stacks in reverse order to the way they went on. Because the items stored on our pegs are only single numerals, we are able to use a simple "trick"[1] to represent each of our three stacks. We just construct a number for each digit we want to represent. The TI-99/4 and 99/4A employ numbers accurate to 13 decimal places using a radix-100 representation, so we can push and pop numerals onto and off the left end of these with abandon, multiplying and dividing by 10 without fear of roundoff error.

Homework

Now that you understand how the program works, it's time to personalize it to make it *your* program. Here are some suggestions: Teach the machine to count the moves, recognize an end condition, and tell how many moves it took to get there. Add the pegs and color the rings. Expand the game to five rings.

Finally, if you make some estimates of how fast the monks are moving each golden ring, you can determine how much time the world has left. (You will need to know the fastest way to shift the rings.) If the holy men went modern and taught their TI-99/4 to move a ring every microsecond, would you be ready to sell your long term bonds at a discount?

[1] If you find an application for this "trick" in a program of your own, you will be entitled to call it a "method." (A "method" is a trick used twice).

```
100 REM **********************
110 REM * TOWER OF HANOI *
120 REM **********************
130 REM 99'ER VERSION 2.4.1
140 REM BY S. T. HOLL
150 REM
160 REM
170 DIM PEG(3),TOP(3)
180 CALL COLOR(7,1,1)
190 CALL COLOR(8,2,2)
200 PEG(1)=1.357
210 PEG(2)=0
220 PEG(3)=0
230 TOP(1)=10
240 TOP(2)=14
250 TOP(3)=14
260 CALL CLEAR
270 CALL HCHAR(10,6,88,1)
280 CALL HCHAR(11,5,88,3)
290 CALL HCHAR(12,4,88,5)
300 CALL HCHAR(13,3,88,7)
310 CALL KEY(3,FROM,STATUS)
320 IF STATUS=0 THEN 310
330 CALL KEY(3,DUMMY,STATUS)
340 IF STATUS=-1 THEN 330
350 FROM=FROM-48
360 CALL SOUND(100,110,3)
370 CALL KEY(3,TOO,STATUS)
380 IF STATUS=0 THEN 370
390 CALL KEY(3,DUMMY,STATUS)
400 IF STATUS=-1 THEN 390
410 TOO=TOO-48
420 CALL SOUND(100,262,2)
430 IF (FROM<1)+(FROM>3)+(TOO>3)+(T
    OO<1)THEN 310
440 IF (PEG(FROM)=0)+((PEG(TOO)<>0)
    *(PEG(FROM)>PEG(TOO)))THEN 310
450 SIZE=INT(PEG(FROM))
460 TOP(TOO)=TOP(TOO)-1
470 CALL HCHAR(TOP(FROM),3+(FROM-1)
    *9+.5*(7-SIZE),87,SIZE)
480 TOP(FROM)=TOP(FROM)+1
490 CALL HCHAR(TOP(TOO),3+(TOO-1)*9
    +.5*(7-SIZE),88,SIZE)
500 PEG(FROM)=10*(PEG(FROM)-SIZE)
510 PEG(TOO)=.1*PEG(TOO)+SIZE
520 GOTO 310
```

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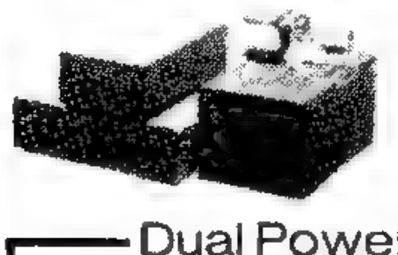

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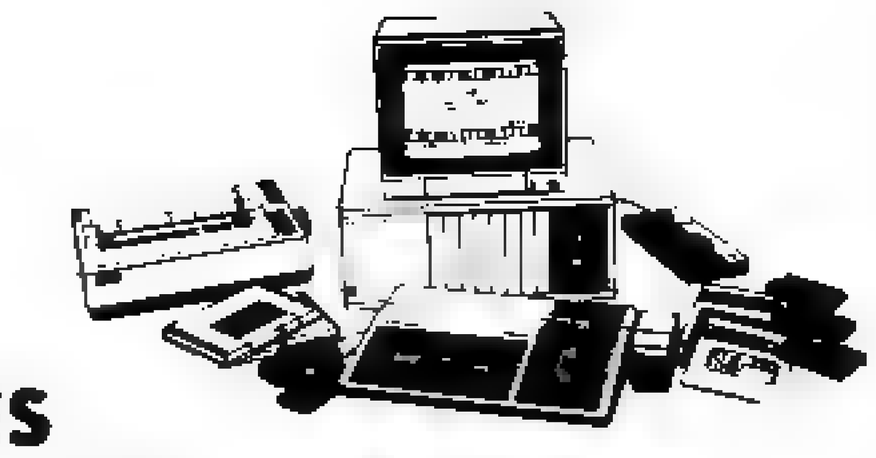

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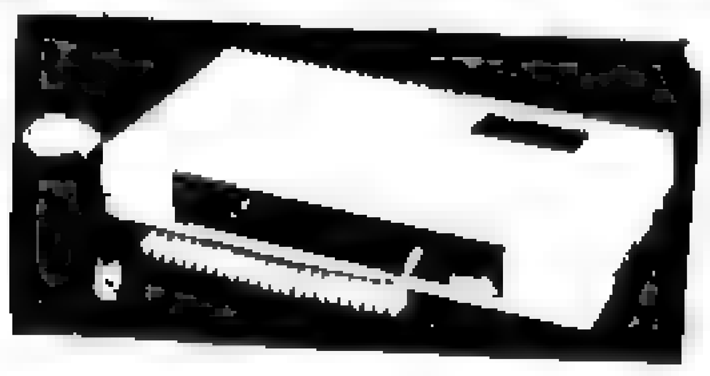

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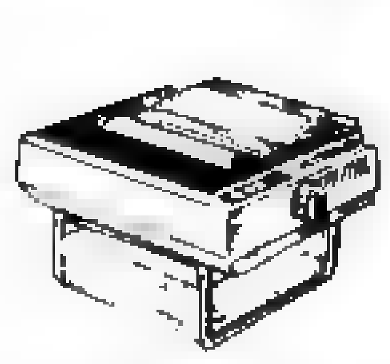

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The Joys of Adventuring

Part 2

By Samuel D. Pincus

Contributing Editor

You are trapped in a maze and monsters threaten from every corner! The maze seems *familiar* but you can't remember how you got out last time. That's right—you used a key. But you just dropped your key in another room. If only you could remember what you did last game or where you put that key. If only you had a *strategy* for these adventure games, instead of stumbling through them at the mercy of the warlocks, vipers, or other powers that be.

Last month in the first part of this article I talked about adventuring in general, telling how to chart a course and avoid the snares that can crop up in these games. This final part offers six rules or strategies to help you win these "puzzle," and "sword and sorcery" games. Are you ready? Then let's go.

Rule 1 – Make a Map!

Most adventures take place in mazes that are broken into 25-30 different locations called rooms by adventurers. One can enter these rooms either the obvious way (through a door or window) or through less common methods (chanting a spell or drinking a potion). In most if not all of the Scott Adams adventures at least one of the doors is locked. In any case the only way to keep track of your moves from room to room is to make a map and update it continually. Even if you think your memory is up to keeping track of the various locations, a map is good insurance against too many mistakes. Remember, sometimes you will have to return to a room in order to complete the adventure. You may even have to go back to the starting point.

In addition a really nasty adventure writer will include both *fly-traps* and *mazes*. In a real fly-trap room you are sure to die every time, but in the Scott Adams adventures, you will find yourself in fake fly-traps. This means that you may indeed die whenever you enter a particular location *unless you have previously done something required of you*. For example, in one BASIC adventure the only way I could get out of a room (through a locked rusty door) was to drink a strength potion. Had I not drunk it, the room would have been a fly-trap. A map is invaluable in remembering which rooms are dangerous.

In a maze you always seem to return to the same location no matter which way you move. It can be confusing to move from room to room, all identical. A map helps you keep track of the maze.

Whenever you enter a room, update your map with the visible exits, the room contents, and anything else you think is important. List all contents no matter how trivial they may seem. You can never tell when a glass, or a match, or an empty box will become very important later on.

computer gaming™

Computer Gaming is a magazine for all game lovers players, designers, and programmers of microcomputer games. Regular features include product reviews, letters to the editor, player strategy, a question and answer forum, a Hall of Fame for high scorers, tutorial articles on game design and programming, plus interviews with professionals in the world of computer gaming

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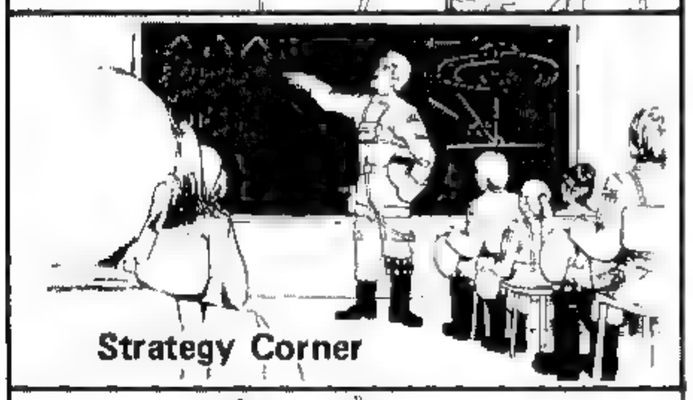


Make sure you note where your exits took you. In the booklet that comes with the ADVENTURE Command Cartridge, Scott Adams presents some suggestions on map-making. Read his suggestions and try to follow them. Don't get discouraged if your first efforts look like a bowl of spaghetti. Just wait until the map looks too hard to follow and then redraw it. Even the most experienced adventurer has to redraw during his game. If you find a previously unknown exit from the room (a hidden passageway, for example), don't forget to add it to the map. Write down what you did to find the exit, and retrace your path.

Rule 2 – Save the Game!

All Scott Adams games allow you to save your game status—such as your current room location, inventory, and clothing. Use this feature after every 10 rooms or so. It will help you restart your adventure in case you do something foolish and get killed. Always save a game before doing anything that you know is dangerous (such as pushing a button). In some of the more difficult adventures, I have saved different game strategies, then started from the beginning with the idea of doing things in other ways.

Never get so engrossed in the game that you forget to save it. If you successfully negotiate a maze, and then get killed off, it is very frustrating to do it all over because you didn't type in SAVE GAME.

Rule 3 – Look, Look, Look!

Whenever you enter a room, its contents will usually be described to you in detail (unless you have been blinded during your adventure or the lights are out or.....). But don't rely on the descriptions alone. Examine everything (using the EXAMINE or LOOK command) in the room. Pay attention to every item in the room. Look at it. Move it. If it is a book or a piece of paper, *read* it! If the room has writing on the wall, read that too. And don't forget to examine pictures, rugs, or other items that are on the floor, walls, or even ceiling. Try to get as much information as possible.

If there is a container, such as a box or chest, open it and look inside. If something falls out, you will find it added to the description of the contents of the room. So if you open a chest and the adventure says "there's something there," look at the room contents to find out what it was. By the way, if something does fall out, that is no reason to stop examining the container. A writer of difficult adventures may have an unimportant item fall out first and leave the really important contents for last. Keep looking until you are *told* that there is nothing important left.

If you try to move a certain item, and it doesn't budge, it may mean the item isn't important. Just as likely, however, it only means that you don't have the skill or tool to move or get the object. For the moment, just put it on your list. A room that you stumble into later may contain just the thing you need to move the rock or lift the chain.

Rule 4 – Keep Track of Your Inventory!

Keep track of everything you carry. If you enter a room and see something you think you may need, just tell the game to GET it. The only problem is that, as in real life you can't carry everything. Sooner or later, you will have too much. You will have to DROP something to make room for a new item. This isn't hard, as long as you remember to DROP items after they have been used (for example, an empty gun or burnt out match). In most adventures, an item is used only once. Sometimes, however, it may be needed later. Remember, you can never be sure of anything!

In sword and sorcery play, you must also keep track of your status. If you are wounded, your strength ebbs as you continue your journey. You may decide to fight a creature under the assumption that your strength is still high when in fact, you are bleeding to death!

Rule 5 – Keep Track of Objects!

Always update your map with the items you find in a room. If you take out an object, cross it off your map. If you then drop it in another room, relocate it on your map. It is embarassing to forget where you dropped your gun when you need it to kill a rattlesnake

Keep in mind that objects may change during a game. A lump of dirt, when washed, may reveal a crystal ball. A branch when whittled, becomes a flute. Make sure you note how an object changed, what you did to change it, and where it is now. A change may be very subtle—a match burns out, a canteen is filled or emptied. Note even these slight changes.

Rule 6 – Try, Try, Try!

When you try something and find yourself stymied, don't give up! There is usually an alternative. First, try different commands. For example, you may say WET RAG and be told that the game doesn't understand. You may have to try POUR WATER in order to wet the rag. If you run out of commands, look for a different approach. You may have to pour the water into a pan and then say DUNK RAG. Of course, it may turn out that nothing will work—that you are indeed trying the impossible. Very often, however, you are just not using the right approach. For example, you may be traveling on a tree-lined path with exits to the north and south. After exploring these exits, you find that you can't get anywhere. Don't give up! Did you try to climb a tree? That may be your only way out.

Maybe you are sure that the treasure is in the room, but you can't see it. Did you dig for it? Just because you have gone over all the *visible* objects and obvious exits, don't think you have exhausted all the possibilities.

You are not limited to moving in just four directions. Up and down are also possible. In addition, a lot of adventures let you say things like GO PATH if you want to travel along a path or GO MOUNTAINS if that is what you see in the distance

If you do find yourself in a real pickle (such as the maze I mentioned earlier), do not panic. Think it through. Act as though this were real life How would you solve the problem then? In a maze you could drop an object and then move. If the ob

Continued on p. 50

PROS ON PROGRAMMING

Editor's Note: This four-part series is more than a game. It is a course in programming, covering many of the fine points of the art. Part 1 (Vol. 1, No. 4) gave some basic rules for designing games. Part 2 (Vol. 1, No. 5) laid out a coding plan for a "stripped down" version of the game. Part 3 (Vo. 1, No. 6) showed how to code in the complete program and how to debug it. In this final portion, Mr. Pincus shows how to add graphics using Extended BASIC. The complete Chuck-A-Luck Extended BASIC program is also included here.

Chuck-A-Luck

Part 4

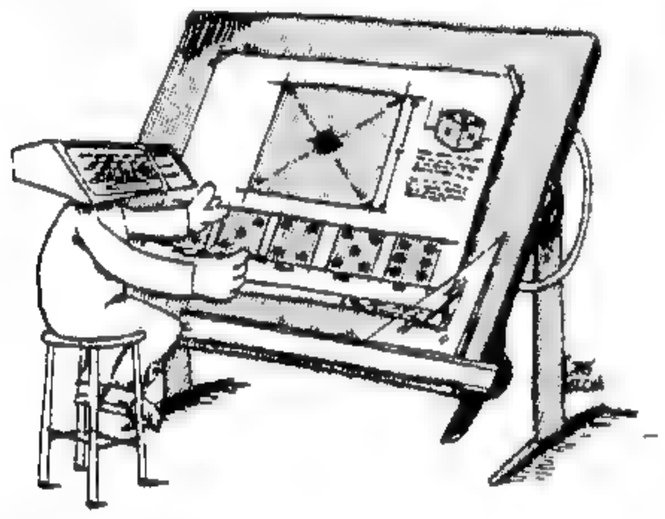
By Samuel D. Pincus
Contributing Editor

Before me was the task I had been putting off from the beginning: to plan the graphics for the DICE—ROLL routine

Because the program had been coded in TI BASIC all along, I coded this routine using HCHAR and VCHAR graphics. It occurred to me however, that the Extended BASIC graphics ability (i.e., sprites) would add a lot to this program. Then I saw that it could be done both ways.

The only problem was that I am not very graphics oriented. Oh, I do all right, but I am no world-beater at eye-boggling displays. That left me one option: I called for HELP!! and turned to my "Guru of Graphics," Ron Binkowski. You may have seen his name on some fine programs he wrote for *99'er Magazine*.

I asked Ron to develop a graphics routine to display dice rolling inside a Chuck-A-Luck wheel. About two weeks later, he called me back with the bad



news, "No dice" (pardon the pun, I just couldn't resist it). Rolling the dice was just too complicated for this program, but Ron did come up with an idea to move them graphically.

Starting to Roll

I reworked Ron's routine so that it could support both SPRITE graphics for inclusion in the Extended BASIC version and HCHAR graphics for TI BASIC. The design indicated that DICE_ROLL needed an initialize routine (to set up some variables) as well as the actual graphics roll itself. I added another module to display each player's name, cash balance, amount bet, and dice value bet

The DICE—ROLL routine needed three new arrays. Each die can be thought of as a formation 3 pieces high and 3 pieces wide. Each character can have either a dot ("pip") or be blank. Since there are three dice and each needs 9 characters, we will have to keep track of the locations of 27 characters. The 9 characters for the first die will be numbered 1-9; for the 2nd die, 10-18; and 19-27 for the third die. The array called LOC_X keeps track of the "x" co-ordinates (the horizontal rows) of these characters while LOC_Y keeps track of the "y" co-ordinates] (the columns). This means that both of these arrays must be DIMensioned with 27 entries.

The array called DICE_PIP tells whether characters are blank or have a pip for each possible value of the dice. Since there are six possible dice values, each to contain information on nine characters, we will need a two-dimensional array composed of 9 entries for each of 6 possible dice-values.

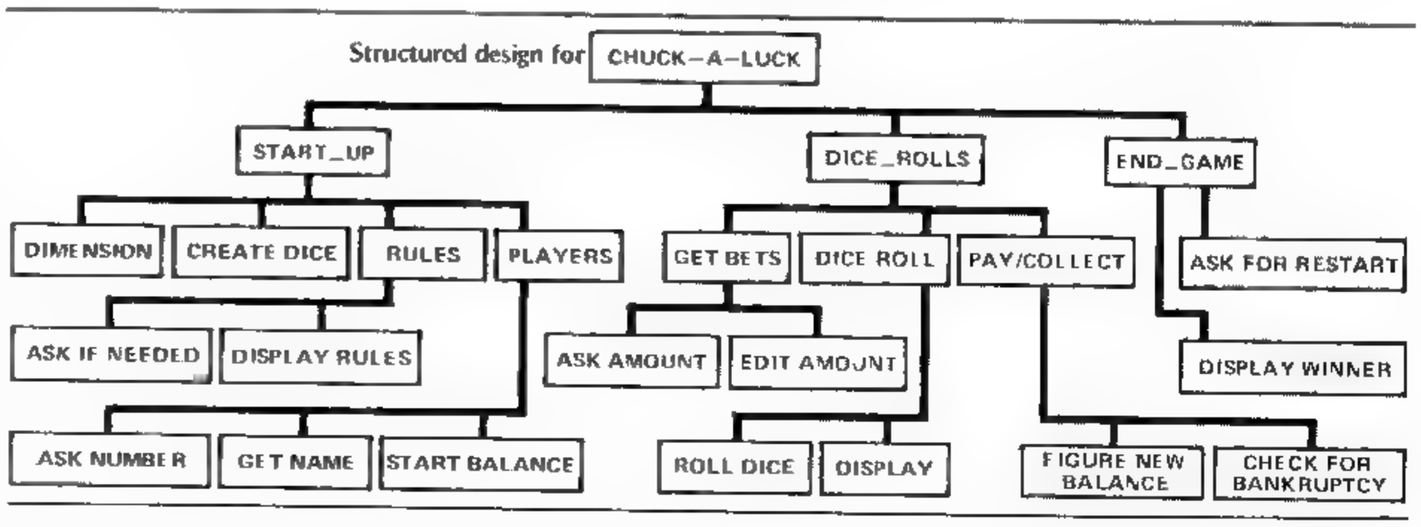
Arrays are Like Buildings

Remember our discussion about arrays? I said that you can envision an array as a building with a number of rooms on each floor. Well, in a two dimensional array, the first variable can be thought of as the floor number. The second number is the room on the floor. For example, you can think of DICE_PIP(2,4) as the value located in the 4th room of the second floor of a building called DICE_PIP. For our program it will contain the information about the 4th character (middle row on the left) needed to display a dice roll of a 2.

To make the display more interesting, Ron added 3 more dice values. He realized that, depending on how a die fell, the values of 2, 3, and 6 could be portrayed two different ways. The three extra "floors" in DICE_PIP are alternate displays for the values of 2, 3, and 6. This meant the DICE_PIP had to be DIMensioned as (9,9). I added this code as line 110. In addition, for the SPRITE version of the routine in Extended BASIC, Ron needed an array to keep track of particular pieces of the die, to determine if they were in position. He called this array LOC, and since there are 27 different pieces, I DIMensioned it at 27 in line 120.

I then added the code in lines 20010-20420 to fill in the data needed for the new arrays. Lines 20100-20200 are used to read in the data for DICE_PIP. Each DATA line (in 25000-25080) describes whether a character of a dice value is supposed to be blank (=0) or have a pip (=1). Each line gives the information needed for the 9 characters making up the dice value. Line 25090 is an extra DATA line. TI BASIC usually slows down when it reads the last DATA line in a program, but with an extra DATA statement, it never reads the last line, and never slows down.

In order to simulate the DISPLAY AT function, available only in Extended BASIC, I added a routine to the TI BASIC version in statements 4900-4930 to print whatever was in MSG$ beginning at COL on the row contained in ROW. It runs much faster than the code given in TI's Programming Aids I software package, because it is restricted to a single row and does no preliminary editing of the message area. In lines 20300-20420, I added the codes to show where each of the 9 characters for each die are to be displayed. In the TI BASIC version, these are actual row and column numbers. In the Extended BASIC version, these contain the "dot row" and "dot column" values needed for sprites.



I then coded lines 2000-2370 to display the information about each player on the screen. The new code in 2600-3920 displays the three dice values graphically. Lines 2630-2740 give a 50-50 chance that a dice value of 2, 3, or 6 will be displayed in its alternate format. The 9 characters making up the die are then displayed in the loop in lines 2750-2990 in the TI BASIC

Continued on p. 51

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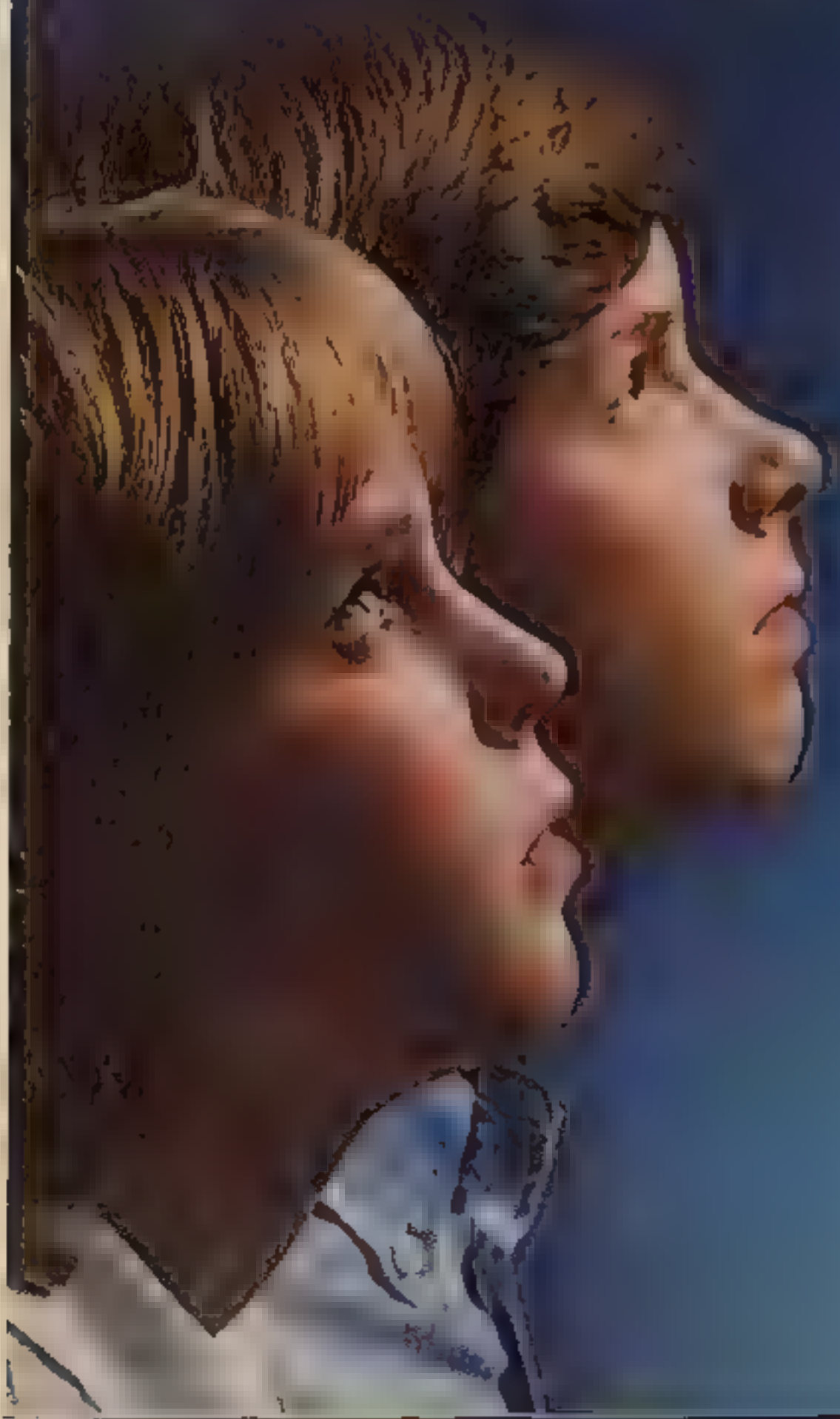

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Lifeline to TITAN

By Bill Bies
217 Park Entrance Dr.
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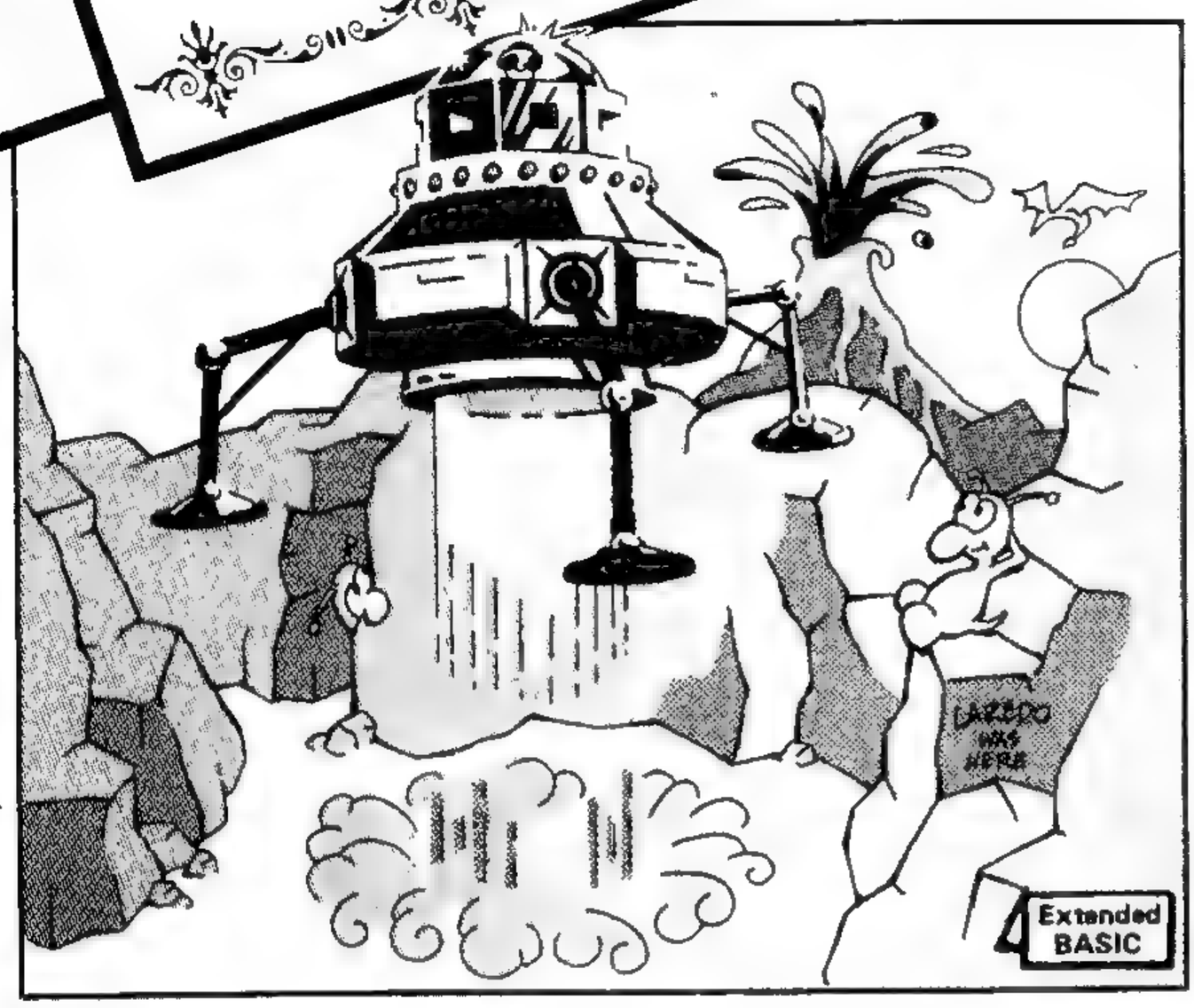

At long last, our resupply mission is almost completed. Over 25 months ago (it seems like 25 years) we left Earth for this desolate mining community on Titan, Saturn's largest and richest moon. I guess we should be thankful—our TI-NAV computer shaved three months off the trip by using the gravitational "slingshot" effect around Jupiter.

Unfortunately, like almost all mining communities, this one is located in the middle of the roughest mountain range on Titan, and landing here reminds one of playing Russian roulette . . .

I can make out the mountain range as we descend for our final approach. The landing site is now coming into view. They call that a landing site? It's not much more than a rocky ledge with a mountain to one side and a cliff to the other! If I can land this one, I'll be asking for a bonus. Oh well, here goes *everything* . . .

You can finish the story when you run this Extended BASIC program. A random landscape on the screen is created, and the object of the game is for you to maneuver your lander to the only flat part of the terrain.

There are three levels of difficulty—the higher levels providing a smaller pad to aim for. On the third level you barely have room for your lander.

You can maneuver your ship with either the keyboard or joystick #1. On the keyboard you use the S and D keys to rotate the lander, and V to fire your rockets. On the joystick you merely move the paddle left or right, and press the fire button for thrust.

Now that you're ready, put on your helmet and strap yourself in. There are some desperate miners down there, and you wouldn't want to "alienate" a Titan miner when he's hungry . . .

EXPLANATION OF THE PROGRAM
Lifeline to Titan

Line Nos.	
100-160	REM statements.
170-190	Check for expansion memory. If it's there, delete all sprite motion.
200-260	Initialize variables and set character colors.
270-360	Define character patterns.
370-420	Initialize arrays.
430-460	Set up title screen.
470-480	Branch to set up playing screen.
490-800	Main control loop.
810-960	Display title screen.
970-1040	Display instructions.
1050-1490	Display landscape.
1500-1650	Display playing screen and messages.
1660-1740	Ship explodes. End of game.
1750-1810	Input options for the next game.
1820-1850	Initialize variables to play the same game.
1860-1980	Good landing.
1990-2060	Do instant replay.
2070-2130	Subroutine to play a sound.
2140-2230	Subroutine to do explosion.
2240-2280	Subroutine to stop sprites.

```
100 REM  ************************
110 REM  *  LIFE LINE TO TITAN  *
120 REM  ************************
130 REM  BY BILL BIES
140 REM  99'ER VERSION 2.4.1XB
150 REM
160 REM
170 ON ERROR 210
180 RAM$="N"
190 CALL INIT :: CALL LOAD(-31878,0
    )
200 RAM$="Y"
210 CALL CLEAR
220 RANDOMIZE
230 FOR SET=1 TO 14
240 CALL COLOR(SET,16,1)
250 NEXT SET
260 CALL SCREEN(9)
```

```
270 CALL CHAR(40,"80402010080402010
    10204081020408OFF"&RPT$("0",28)
    &"FF")
280 CALL CHAR(96,"0010102828447C820
    0081818286898040004081828C83008
    00020C34C8281010")
290 CALL CHAR(100,"000002BC48502020
    0000807E4C3020400080605B4658608
    04020304C7E800000")
300 CALL CHAR(104,"20205048BC020000
    101028CB340C02000830C828180B040
    0049868281818080O")
310 CALL CHAR(108,"827C442828101000
    2019161418181000100C1314181020O
    00808141320C304000")
320 CALL CHAR(112,"04040A123D400000
    02040C327E0100000106lA621A06010
    00000017E320C0402")
```

```
330 CALL CHAR(116,"0000403D120A0404
    0040302C1314080800201018141301C1
    000101818141619201")
340 CALL CHAR(120,"001018181416194"
    )
350 CALL CHAR(122,"0000040202000000
    0000000404040000000000001008080
    0000000000020202")
360 CALL CHAR(126,"0000000000206030
    0000000080A0606000000000020202
    0000000707010101")
370 DIM DIR(28,2),HGT(256),N$(3),RP
    LY(25,3)
380 N$(1)="CADET" :: N$(2)="OFFICER
    " :: N$(3)="VETERAN"
390 RESTORE 410 :: FOR CELL2=1 TO 2
    :: FOR CELL1=1 TO 24
```

Continued on p. 38

Night Blockade

By Ants Reigo
161A Kenwood Ave
Toronto, Ontario Canada M6C 256

Man your battle stations. ENEMY ALERT! It is a nice quiet evening on board your battleship, until an enemy task force tries to break the blockade you've set up. To make things worse, it's night—so you can't even see the enemy. All you have to guide you is the beeping of your radar scope. Suddenly you open fire on the intruders, and with each explosion the night sky lights up, giving you a better idea of what you're up against.

Night Blockade was written in an effort to come up with a fast-action game—one in which the entire keyboard is read as rows and columns on the screen, so that aiming your cannon is as simple as pressing a single key.

Playing the Game

When the menu screen appears, select the "NEW GAME" option. The screen will go black, and a small green radar scope will appear at the bottom of your screen. Enemy vessels show up on the radar scope, accompanied by a beep. Your objective is to direct the firing of your ship's cannons to destroy the enemy. To do this, press the space bar to put your cannons in firing mode. That mode will be confirmed by either "firing mode engages" (the 99/4A), or a magenta rectangle (the 99/4). Once in firing mode, you can press any key to fire a shot. Each shot fired will light up the screen, momentarily giving you the precise location of the ships. At first you are limited to six shots per round before having to reload. If enemy missiles strike your ship, they will knock out some of your guns and reduce the number of shots you can make without reloading. If you do not fire immediately after entering the firing mode, the computer will leave firing mode and return to radar scan.

The only way to win the game is to stay alive. There are, however, two ways to lose: If you let two ships get by you, or your fire power is reduced to zero, the game will end. A display shows you the number of ships you have sunk and your percentage of hits vs. misses, with the option of starting a new game.

If you wish to take a break in the middle of the game, press the ENTER key. It takes you back to the option page where you can resume play by selecting the CONTINUE option.

Note: If you have the 99/4, the letters in lines 2320, 2330, 2340 and 3340 should be changed to upper case.

EXPLANATION OF THE PROGRAM
Night Blockade

Line Nos.	
170-250	Sets appropriate keyboard flag for 99/4 and 99/4A.
260-320	Displays instruction page while DATA statements are read and graphics characters defined.
330-350	Character definition data.
360-430	Sets of screen coordinates for row and column arrays.
440	Radar scope correlates for target positions.
450	Initial values for new game.
460-570	Array reading and character definition.
580-600	Colors for graphics set.
610-660	Displays menu and branches to selection
670-690	Additional coordinates for ENTER on 99/4A and ENTER and period on 99/4.
700-720	Initialization for new game.
730	Turns Firing Mode Indicator off.
740	Sets up screen.
750-1220	Main loop.
760-800	Keeps track of shots, resets shot counter and checks for end of game.
810	Branches randomly to immediate missile launch.
820	Conditions for immediate missile launch
830	Ship postions are incremented.
840	Conditions for delayed missile launch.
850-910	Branches randomly to missile launch by first or second ship or bypass of missile launch. Line 880 registers player reaction.
920	Draws scope.
930	Displays ships and blips.
940	Produces radar scan.
950-1000	On player input branches to firing mode, menu, repeat scan or beginning of game cycle.
1010-1020	Turns loading Indicaor off and Firing Mode Indicator on.
1030-1170	Produces repeated scan with space bar down or shot with firing key. After initial repeat scan space bar acts as pause key.
1180-1220	Increments shot counter and checks for current limit of permitted shots, turning Loading Indicator on if limit reached.
1230-1260	Checks for hit.
1270-1510	Ship destruction.
1530-1810	Subroutine to increment ship positions. This is in two stages: a simple addition to each postion and a randomly assigned addition to make ship progress less regular.
1820-2110	Subroutine to display ship and blips.
2120-2200	Subroutine to display flash of ship destruction and sound of explosion.
2210-2250	Subroutine for flash of gunfire and missile launch.
2260-2390	Subroutine to set up screen for game.
2400-2590	Subroutines to turn Loading and Firing Mode Indicators on and off.
2600-2750	Subroutines to draw scope and produce scan.
2760-2910	Instruction page.
2920-3050	Menu.
3060-3110	99/4 key redefinition.
3120-3430	Light and sound effects of missile explosion. At line 3260 program resumes at 920 if SM = 0. Otherwise damage is determined and reported.
3440-3910	Defeat message. Missile launch.

Listing begins on p. 39

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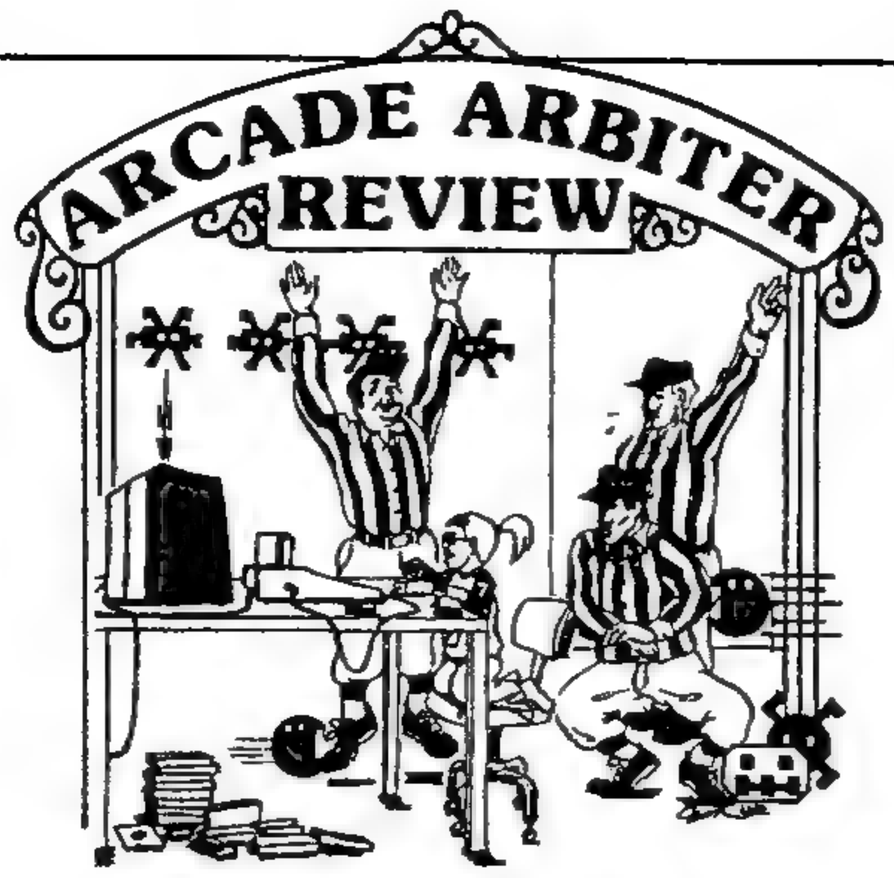

The Chicken

Reviewed By Steve Schwartz
Games Review Editor

Author:	**Tom Perkowitz**
Program Type:	**Arcade "Chicken Crossing the Road"**
Language:	**Extended BASIC**
Distributor:	**Tomputer Software** **1550 Montgomery Drive** **Deerfield, IL 60015**
Price:	**$7.96 cassette**

Why did the chicken cross the road? Most computer games give you the stock reply: "to get to the other side." But the new *Chicken* game program from Tomputer Software has a much more sensible answer: " . . . to eat all the chicken feed lying on the highway."

This game is superior to the other "chicken crossing the road" games I've seen. Not only are there good graphics and speed, but you can also move the chicken in eight directions—not just up and down. Pushing the fire button on the joystick will make the chicken quickly jump out of the way of a speeding car or motorcycle.

But what makes this game different is that it combines the standard "chicken" game with some elements of *Pac-man/Munchman*: You are trying to avoid the traffic along this multi-lane highway while at the same time trying to gobble up 10 pieces of corn so you'll progress to the next level of difficulty. Each new level gives you the chance of accumulating more points, but you'll also be facing a greater number of vehicles. And since there are 12 pieces of corn scattered around at each level, you'll have to use some strategy in deciding which ones you can safely eat without being run over.

You start the game with three chickens. At first, the road is very easy to cross. By the time you reach the third level, the highway is bustling with traffic. Make the right moves and you'll be rewarded with bonus chickens—move too slow and your goose is cooked!

Chicken from Tomputer Software is definitely a game where it pays to eat and run. And $7.96 is "chickenfeed" for a game of this caliber.

Froggy

Reviewed By Steve Schwartz
Games Review Editor

Author:	**A. Green and J. Couto**
Program type:	**Arcade Frog Jump**
Language:	**Extended BASIC**
Distributor:	**Extended Software Company** **11987 Cedarcreek Drive** **Cincinnati, OH 45240**
Price:	**$9.95, cassette or disk**

Home computer games don't have to be exact copies of arcade games to be good. A fitting example is *Froggy*, a new program patterned after the very popular *Frogger* arcade game—but with a challenge quite different from the quarter-eating original.

You start with five of the little beasts, one of which is ready to start jumping from the bottom of the screen across a multi-lane highway bustling with traffic. With either keyboard or joystick, this phase of the game is a snap. Score 5 points for each successful forward (upward) hop.

It gets tougher at the top half of the screen. Here you have to jump your pet from one moving log to the next—six of them altogether—until you get all the way to the top of the screen. Score 50 points for each successful jump and rack up a bonus of 100 points for making it all the way.

If you are talented enough to get all five of your frogs across (a truly amphibious landing) you'll be rewarded with another five frogs—something I've been able to accomplish only once. Since the logs are moving at different speeds and in different directions, it takes steady nerves and precise timing to jump at just the right time. If you miss the log, the little fly-breath will jump into the river and swim away. A hit from a car and your frog will croak. (Sorry, but I couldn't resist it). Either way, you lose!

Unlike the arcade original, you can stay on a log as it wraps around the screen, making it a bit easier to play, but in *Froggy* there's only one log per row. As I said earlier, the challenge is different from *Frogger*.

This is a colorful and action-packed game, sure to delight young and old, and it has lasting play value. The action would be faster with a few more cold-blooded cars in each lane—perhaps more sound effects such as honking horns—but I'm satisfied with *Froggy*, and am eager to see what Extended Software Company will do with my other arcade favorites.

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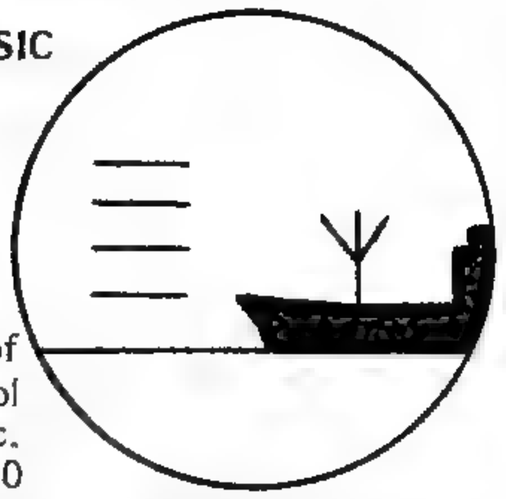

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TITAN . . . from p.30

```
400 READ CELL :: DIR(CELL1,CELL2)=C
    ELL :: NEXT CELL1 :: NEXT CELL2
410 DATA -3,-3,-3,-3,-2,-1,0,1,2,3,
    3,3,3,3,3,3,2,1,0,-1,-2,-3,-3,-
    3
420 DATA 0,1,2,3,3,3,3,3,3,3,2,1,0,
    -1,-2,-3,-3,-3,-3,-3,-3,-3,-2,-
    1
430 CALL DELSPRITE(ALL)
440 IF RAM$="N" THEN 460
450 CALL INIT :: CALL LOAD(-31878,1
    )
460 GOSUB 810
470 GOSUB 1050
480 GOSUB 1500
490 REM MAIN CONTROL LOOP
500 CALL KEY(1,A,B):: CALL JOYST(1,
    C,D)
510 CALL POSITION(#1,Y,X)
520 IF X+4>256 THEN 660
530 IF Y+8>HGT(X+4)+2 AND Y<192 THE
    N 1660
540 IF A=2 OR C=-4 THEN PNT=PNT-1
550 IF A=3 OR C=4 THEN PNT=PNT+1
560 IF PNT=25 THEN PNT=1 ELSE IF PN
    T=0 THEN PNT=24
570 CALL PATTERN(#1,95+PNT)
580 IF RDO=1 THEN 620
590 DISPLAY AT(23,7)SIZE(4):INT(XV)
600 DISPLAY AT(23,21)SIZE(4):INT(-Y
    V)
610 DISPLAY AT(24,20):FUEL
620 CALL POSITION(#1,Y,X)
630 RPLY(PST,1)=Y :: RPLY(PST,2)=X
    :: RPLY(PST,3)=PNT+95 :: IF PST
    =25 THEN PST=1 ELSE PST=PST+1
640 IF X+4>256 THEN 660
650 IF Y+8>HGT(X+4)+2 AND Y<192 THE
    N 1660
660 YV=YV+1+1.5*((1/(4-DIF))/2)
670 CALL KEY(1,A,B):: IF A=13 OR A=
    18 THEN 680 ELSE 750
680 IF FUEL=0 THEN DISPLAY AT(22,1)
    :"FUEL SUPPLY IS GONE" :: GOTO
    750
690 XV=XV+DIR(PNT,2)
700 YV=YV+DIR(PNT,1)
710 FUEL=FUEL-1
720 IF FUEL=10 THEN DISPLAY AT(22,1
    ):"FUEL RUNNING LOW" :: CALL BE
    EP
730 IF FUEL=20 THEN DISPLAY AT(22,1
    ):"WATCH YOUR FUEL SUPPLY" :: C
    ALL BEEP
740 CALL SOUND(-800,125,28,-7,15)
750 IF ABS(XV)>254 OR ABS(YV)>254 T
    HEN 780
760 CALL MOTION(#1,YV/(2-DIF*.25),X
    V/(2 DIF*.25))
770 GOTO 500
780 XV=XV-DIR(PNT,2)
790 YV=YV-DIR(PNT,1)
800 GOTO 500
810 REM TITLE SCREEN
820 CALL CLEAR
830 DISPLAY AT(1,1):"LIFE LINE TO T
    ITAN"
840 DISPLAY AT(3,1):"SELECT YOUR LE
    VEL"
850 DISPLAY AT(5,1):" 1 CADET":" 2
    OFFICER":" 3 VETERAN"
860 DISPLAY AT(9,1):"PRESS ""AID""
    FOR RULES"
870 CALL BEEP
880 CALL JOYST(1,A,B)
890 IF A=0 AND B=0 THEN 920
900 DIF=2-B*.25
910 GOTO 950
920 CALL KEY(0,C,D)
930 IF C=1 THEN 970
940 IF C>48 AND C<54 THEN DIF=C-48
    ELSE 880
950 CALL HCHAR(4+DIF,3,102)
960 RETURN
970 REM INSTRUCTIONS
980 DISPLAY AT(3,1):"YOU ARE PILOTI
    NG A CARGO":"LANDER.YOUR MISSIO
    N IS TO":"TOUCH DOWN ON THE FLA
    T"
990 DISPLAY AT(6,1):"SURFACE USING
    A MINIMUM OF  FUEL."
1000 DISPLAY AT(9,1):"YOU MAY USE S
     & D TO ROTATE YOUR LANDER AND
     V TO THRUST,OR JOYSTICK #1.DO
    N'T THRUST"
1010 DISPLAY AT(12,1):"TOO OFTEN-YO
     U'LL RUN OUT OF FUEL.TRY NOT T
     O HIT ANY     MOUNTAINS!"
1020 DISPLAY AT(17,1):"PRESS ANY KE
     Y TO GO BACK."
1030 CALL KEY(0,A,B)
1040 IF B<>0 THEN 820 ELSE 1030
1050 CALL HCHAR(2,1,32,736)
1060 DISPLAY AT(1,20):N$(DIF)
1070 DISPLAY AT(2,1):"PLEASE WAIT."
1080 LNDSPT=INT(25*RND+3)
1090 ROW=INT((10-DIF)*RND+10-DIF)+(
     4-DIF)*1.5
1100 IF ROW>19 THEN 1090
1110 COL=0 :: DOT=1 :: X=1
1120 COL=COL+1
1130 IF COL=33 THEN RETURN
1140 IF COL=LNDSPT THEN 1410
1150 OLS=SLP
1160 IF INT(5*RND+1)<DIF THEN 1190
1170 SLP=INT(3*RND-1)
1180 IF SLP=0 THEN 1170
1190 IF SLP=1 THEN 1210 ELSE 1310
1200 GOTO 1120
1210 IF ROW<6 THEN 1310
1220 IF OLS=1 THEN ROW=ROW-1
```

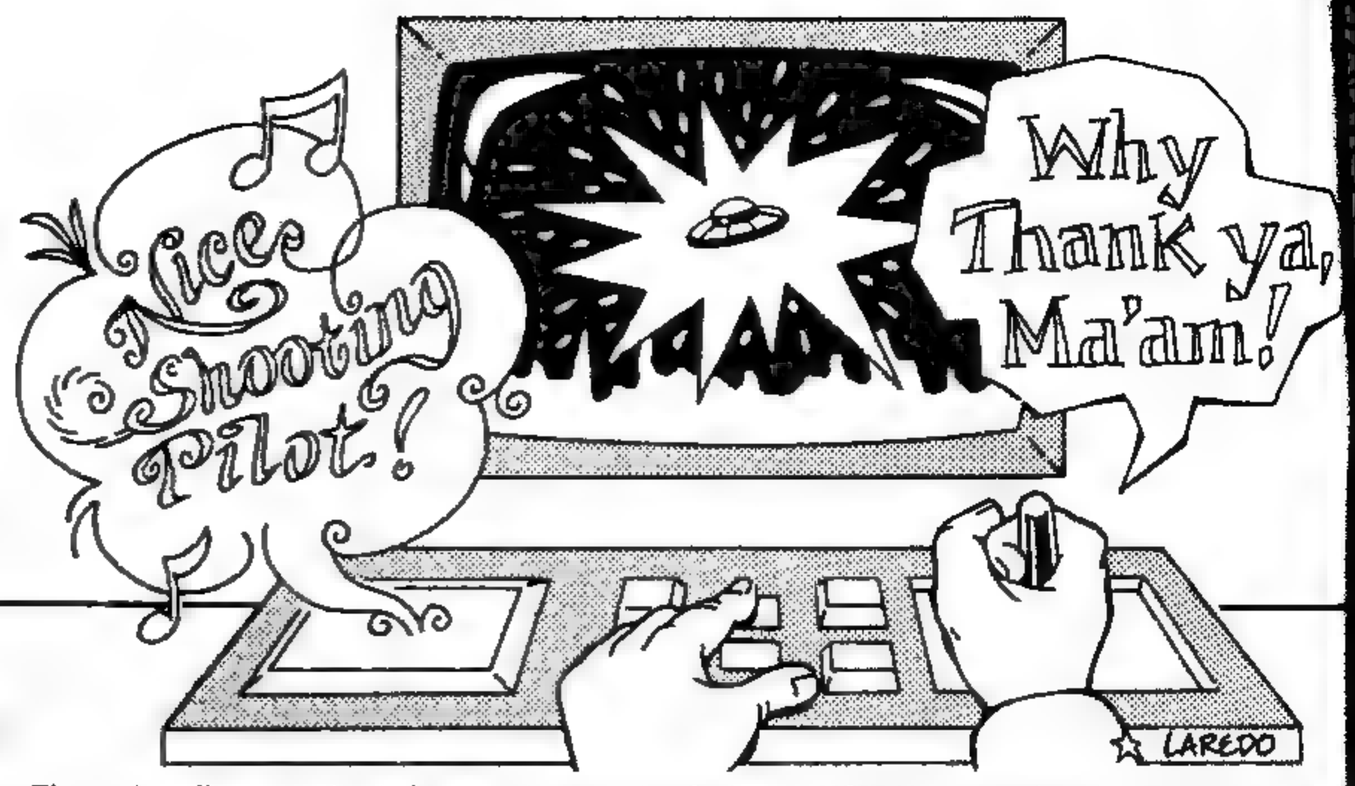
Continued on p. 62

BLOCKADE . . . from p.31

```
100 REM ********************
110 REM * NIGHT BLOCKADE *
120 REM ********************
130 REM BY ANTS REIGO
140 REM 99'ER VERSION 2.4.1
150 REM
160 REM
170 CALL CLEAR
180 PRINT "IS THIS RUNNING ON ": :"
    1) 99/4A OR 2) 99/4 ?": : :"PRE
    SS (1) OR (2)": :
190 CALL KEY(0,K,S)
200 IF S=0 THEN 190
210 IF (K<49)+(K>50)THEN 190
220 IF K=49 THEN 250
230 KBD=0
240 GOTO 270
250 KBD=5
260 REM  ***SCREEN FILL
270 CALL CLEAR
280 DIS=1
290 GOSUB 2830
300 DIS=0
310 TOTSHT=0
320 DIM GRF(14),GRF$(14),SCP(32),R(
    159),CL(159)
330 DATA 136,2996593EFF185492,63,08
    01AA0400558201,33,0000C0FCF8,34
    ,04063FFFFF,35,04063FFFFF,36,04
    063FFFFF,37
340 DATA 04063FFFFF,38,000000FF7F,3
    9,0000000F07,40,0000000301,41,0
    0000001
350 DATA 159,0,158,0000007E7E,42,FF
    FFFFFFFFFFFF
360 DATA 3,7,3,31,3,11,3,13,3,15,3,
    19,3,30,3,23,3,25,3,21,3,27,11,
    26,5,26,11,29,5,27,3,26,3,8
370 DATA 3,10,3,12,3,14,3,16,3,18,3
    ,20,3,22,3,24,8,25,8,26,11,25,3
    ,28,11,28,3,29,3,9,8,7,11,16
380 DATA 11,10,8,11,5,10,8,13,8,15,
    8,17,5,20,8,19,8,21,8,23,11,22,
    11,19,5,22,5,24,5,6,5,12
390 DATA 8,9,5,14,5,18,11,13,5,8,11
    ,7,5,16,11,4,3,5,11,3,3,6,3,17,
    3,28,11,31,8,8,11,17,11,11
400 DATA 8,12,5,11,8,14,8,16,8,18,5
    ,21,8,20,8,22,8,24,11,23,11,20,
    5,23,5,25,5,7,5,13,8,10
410 DATA 5,15,5,19,11,14,5,9,11,8,5
    ,17,11,5,8,15,8,9,8,17,5,4,3,8,
    11,27,8,3,11,18,11,12,8,5,5
420 DATA 5,8,6,8,7,8,27,5,28,8,28,8
    ,29,8,30,11,24,11,21,5,29,5,30,
    5,3,5,6,8,4,5,7,5,27,11,15
430 DATA 5,4,11,9,5,8,11,6,11,30,8,
    31,3,29,3,23,3,25
440 DATA 12,12,13,13,14,14,15,15,15
    ,16,16,16,17,17,17,18,18,19,19,
    19,20,20,21,21
450 DATA 3,3,3,3,11,8,5,3,21,19,17,
    15,0,0,0,6,0
460 FOR X=1 TO 14
470 READ GRF(X),GRF$(X)
480 CALL CHAR(GRF(X),GRF$(X))
490 NEXT X
500 RESTORE 360
510 FOR X=33 TO 159
520 READ R(X),CL(X)
530 NEXT X
540 RESTORE 440
550 FOR X=5 TO 28
560 READ SCP(X)
570 NEXT X
580 CALL CLEAR
590 CALL COLOR(4,11,1)
600 CALL COLOR(5,12,1)
610 CALL SCREEN(2)
620 IF TOTSHT=0 THEN 650
630 GOSUB 2930
640 ON SLXN GOTO 670,740,1520,2770
650 TOTSHT=1
660 GOTO 630
670 IF KBD=0 THEN 3070
680 R(13)=8
690 CL(13)=27
700 REM  ***INITIAL VALUES
710 RESTORE 450
720 READ A,B,C,D,T1,T2,T3,T4,SCP1,S
    CP2,SCP3,SCP4,TOTAL,ESC,SHOTS,L
    IM,MIS
730 CALL COLOR(14,10,1)
740 GOSUB 2270
750 GOSUB 2460
760 RANDOMIZE
770 TOTSHT=TOTSHT+SHOTS
780 SHOTS=0
790 REM  ***TEST FOR END
800 IF (LIM<1)+(ESC>1)THEN 3450
810 ON INT(RND*2)+1 GOTO 820,830
820 IF (TOTAL>10)*(MIS>0)+(TOTAL>12
    )*(MIS=0)THEN 850 ELSE 830
830 GOSUB 1540
840 IF (TOTAL>5)*(MIS=0)+(TOTAL>20)
    *(MIS>0)THEN 850 ELSE 920
850 ON INT(RND*4)+1 GOTO 860,920,88
    0,920
860 GOSUB 3690
870 GOTO 900
880 GOSUB 3520
890 REM  ***DEFENSE CHECK
900 CALL KEY(0,KM,SM)
910 GOTO 3130
920 GOSUB 2610
930 GOSUB 1830
940 GOSUB 2660
950 CALL KEY(KBD,K,S)
960 IF S<>0 THEN 980
970 GOTO 750
980 IF K=32 THEN 1010
990 IF K=13 THEN 610
```

Continued on p. 59

Twenty Questions with the Voice of Parsec



An Interview with Aubrée Anderson

HCM *It was your voice that was used as the model for the speech synthesis on the* Parsec *space game. How were you picked to do the recording?*

AA Well, actually a friend of mine was supposed to be doing the game; that was Bob Hendren. We just met each other at the first of the week. We got to talking and he mentioned that I had a nice smooth voice. A lot of girls have a pretty high voice, but mine was fairly low, and he asked if I would be interested, that was about it.

HCM *Did they tell you why they were looking for a female voice?*

AA It was supposed to sound more like a computer, loosely based on the idea that on *Star Trek* there's always a female voice; and they thought that maybe people would relate to it better.

HCM *What about the characteristics of your voice? Why was your voice chosen for modeling the synthesis?*

AA I don't understand all of it, but the computer has to have a voice within a certain range so that it can pick it up and then reproduce it later. The other girl's voice, for some reason, wasn't being picked up.

HCM *Is it more difficult to digitize, to reproduce electronically, a female voice than a male voice?*

AA Yes, although I didn't have any problems.

HCM *I've heard your voice referred to as one that's "very trainable." Does that mean it's right for the synthesis process?*

AA I think they meant that whenever my voice is played back to me through the computer, I can hear if there's anything wrong (like my tendency to pronounce "s" as "th"). Then I can try to shape my mouth differently or move the throat differently. That's what they meant by trainable—I learn really quickly what's wrong.

HCM *Let's get into the recording process. What was it like?*

AA Well there's a booth, and you just sit down in a chair and speak into a microphone. They do all kinds of things; you should see the computer. They check the sound levels and try to get any distortion out, and then I just start reading words off the monitor right in front of me.

HCM *Do you wear any headphones and do you hear yourself as you speak?*

AA No, I just speak into the microphone, and they play it back and let me hear. Then I fix whatever is wrong the second time through.

HCM *How long does one of these sessions last?*

AA Well, it just depends. The first time, it didn't take too long, about 45 minutes. The second time it took longer—over an hour, I think. After that they got pretty quick. It took about two hours to record all the speech for *Parsec*.

"...On *Star Trek* there's always a female voice; and they thought maybe people would relate to it better."

HCM *Do you have to do things over and over again to get it right for the computer?*

AA Yes, you have to enunciate, especially the consonants. You have to pronounce them strongly, otherwise they don't pick up and you lose k's and t's and s's. I usually go through it once, just to hear what's wrong and then start trying to do it right after that. It takes a while; I used to do three or four tapes.

HCM *When you record, do you put any emotion into it, or are you trying to take emotion out of the voice?*

AA It depends on what the computer programmer asks for. If he wants to be very nasty or chiding, then I'll try to make it that way. And if they want it to be pretty monotone like a computer, then I'll try to do that.

HCM *Did you record just for* Parsec, *or did you record a whole list or storehouse of words that could be used in many different contexts?*

AA I just recorded for *Parsec*, but of course they keep everything on file so they can use it later.

HCM *About how many words or phrases did you actually record for* Parsec?

AA I'm not really sure—about a page. There were very few long phrases. They were mostly three words or so, and there were about 40 of them.

HCM *What did you think of your digital voice in the final implementation of the game?*

AA Well it doesn't sound very much like me. They edited it quite a bit.

HCM *Let's get into your background a little. Can you tell us something about yourself?*

AA Well, I'm a junior at Texas Tech right now, and I'm a major in geology. I don't have anything to do with voices. I've never done oral interpretation or anything like that.

HCM *Have you lived in Texas a long time? Obviously you don't have a southern accent.*

AA I was born in North Carolina, but I left there when I was quite young and I've really been living in Texas ever since I was three. The reason I don't have an obvious southern accent is because my father was born and raised in California, and my mother was born and raised in Hawaii.

HCM *How do you feel about computer games?*

AA They're fun; I've always liked them. I've been playing them ever since I can remember. My father worked at Texas Tech; he had a few games on the computer there, and I used to play with them.

HCM *Have you had a chance to play* Parsec *at all?*

AA Yes, as a matter of fact I have only played it once. I didn't do very well; I didn't even make it to the refueling tunnel.

HCM *How did it feel to hear your own voice in the game?*

AA Well, it didn't sound so much like me.

HCM *Are you a science fiction buff? Do you enjoy the movies or the books?*

AA I am. I liked *The Empire Strikes Back* and also the *Star Trek* film, the first one.

HCM *Now that you are the voice of* Parsec, *do you identify at all with the female computer voice of the Enterprise on Star Trek?*

AA Well no, there's really almost a million variations. As I remember, on the second movie they even used a male voice.

HCM *How do you feel about the fact that soon there may be hundreds of thousands of people who will hear your voice in their own living rooms?*

AA I don't know, it's kind of neutral. Maybe if I walked into a house and heard somebody playing it, I'd say "Hey, that's neat."

Texas Instruments

at the Winter Consumer Electronics Show January 6 - 9, 1983

Residents of Las Vegas have seen it all—the high rollers, the down-on-their-luck losers, the hype, and the scams. But the most exciting game in town this past January was *not* at the green-felt baccarat tables of the Sahara, the whirling roulette wheels at Caesar's Palace, or the bawdy, smoke-filled atmosphere of the infamous Palamino Club. . .

It was at the Las Vegas Convention Center where the *real* action took place: Over 80,000 eager spectators gathered in this mammoth arena during the week of January 6-9 to witness the clash of the consumer electronics titans. Here, at the Winter Consumer Electronics Show, one Titan clearly emerged victorious in the relentless battle for dominance in the home computer marketplace—receiving accolade upon accolade from the much-impressed crowd. . .

Rising from the convention floor's Aisle 700 was the jet-black, solid-state citadel of Texas Instruments—a magnificent structure over two stories high—a structure that had to be transported to the show on no less than six huge 18-wheelers.

Showgoers couldn't help but be attracted to the gigantic, ebony exhibit with its multi-colored, phosphorescent product displays and quadraphonic, 12-voice, TI-99/4A-driven music synthesizer projecting the theme from *Chariots of Fire*. And once there, they were treated to some astounding advances in consumer electronics technology .

At the show, we actually used the TI-99/4A and Personal Record Keeping Command Cartridge with the Wafertape drive

Although the TI-99/4A Home Computer did not have a whole new line of peripherals introduced *expressly* for it, the announcement of a particular peripheral from the Milton Bradley Company astonished the trade and press alike. The Milton Bradley *Expander* is one revolutionary product that actually "speaks (and listens) for itself." This plug-in (via the joystick port) peripheral will, for the first time, make voice *recognition* available and affordable on a popular home computer—the TI-99/4A. The unit comes with a 64-position membrane keypad with overlays for various software Command Cartridges that Milton Bradley will be producing for Texas Instruments.

Included in the package (with a tentative retail price in the $75–$100 range!) are a headset microphone for the voice command function, as well as a precision, 3-axis analog joystick. This new peripheral also contains an additional connector for the second joystick, an expansion port for future add-on devices, and both speech *synthesis* and *recognition* via the 2-way "Magic Recognizer Chip."

Voice Command Steals Home

Although the TI exhibit contained Milton Bradley's *Expander* peripherals and had the 10 new Milton Bradley game cartridges up and running, it wasn't until we went to Milton Bradley's own exhibit across the aisle that we were able to actually witness human voice *recognition* in an interactive game. After "training" (repeating into the microphone twice) the *Expander* to recognize each player's pronunciation of the nine baseball team positions, the player whose team is in the field can throw the baseball around the screen simply by *voice* commands. Both players simultaneously use the keypad and joystick to manipulate the pitching and batting. Imagine shouting, "Right," and seeing your right fielder chase after the ball; then on your verbal command of "Second," having him fire the ball into second base.

The Milton Bradley *Expander* and software cartridges are to be distributed exclusively by Texas Instruments. The ten initial game cartridges are *Championship Baseball*, *Bigfoot*, *Sewer mania*, *Honey Hunt*, *Soundtrack Trolley*, *Bug Hunt*, *Superfly*, *Meteor Belt*, *Space Bandit*, and *Terry Turtle's Adventure*. Of these ten, we felt that *Championship Baseball* and *Bigfoot* (a "climbing-and-obstacle-avoiding game" à la *Donkey Kong*) had the potential to become real video game hits.

A Spreadsheet Dragon Mix

We finally got to see the *Othello™* (CBS Toys) and *Alpiner* game cartridges (suggested retail price of $39.95), the *TI-Count* business software (with *each* of the six accounting, inventory, or mailing list packages at $99.95); Microsoft's *Multiplan™* consisting of a cartridge, disk, and 326-page manual in 3-ring binder for $99.95; and six new educational cartridges from DLM Arcademics (*Alligator Mix*, *Alien Addition*, *Minus Mission*, *Meteor Multiplication*, *Demolition Division*, and *Dragon Mix*). Texas Instruments also announced first quarter availability of four Milliken packages (*Number Readiness*, *Laws of Arithmetic*, *Equations*, *and Measurement Formulas*), and two new Scott Foresman packages (*Numeration I and II*). During the second quarter of 1983,

TI will add Addison-Wesley's *Computer Math Games* (I, III, IV) to the previously announced *Math Games* II and VI

From Plato to the Stars

The PLATO educational software was finally demonstrated at the show. TI color monitors treated showgoers to a preview of the initial package, a Basic Skills survey (at a suggested retail price of $49.95) that allows parents and teachers to help select appropriate courseware for individual needs and skill levels. [For a discussion of PLATO, see *99'er Magazine*, January 1983—Ed.

TI also introduced (under license with Westinghouse Learning Corporation) a new software package for people who want to learn conversational Spanish. This package, *Key to Spanish*, consists of a 3-ring binder containing 4 Command Cartridges for the TI-99/4A, 4 audio cassettes, and an instruction manual. The audio cassettes are controlled by the cartridges, helping beginners to pronounce Spanish in conjunction with the lesson plans. The suggested retail price of the package is $149.95.

We also saw a new peripheral that will prove useful with the above language cassettes, as well as with program and data files (both user-written and commercial products). The TI Program Recorder with suggested retail price of $69.95 is optimized for use with the TI-99/4A and TI-99/2 computers. The recorder has color-coded input jacks and a digital tape counter, among other features. It comes with a computer interface cable for the TI-99/4A. (The TI-99/2 comes with its own interface cable.)

Although announced in the show's product literature, the two entertainment software packages that probably would have been the most interesting weren't ready in time for exhibition. We'll just have to wait a little longer to see if our friend, *ET*, actually goes home, or if the *Battlestar Galactica* ever finds Earth.

Watch for more detailed coverage of all of the new TI products starting with the March issue.

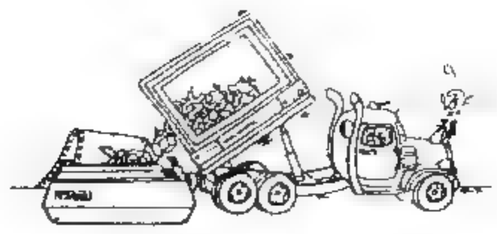
DeBUGS on DisPlay

99'er Program Bug

LISTING #1 (SEGMENTED)
SCREEN DUMP PROGRAM FOR MINI-MEMORY
BY PATRICIA SWIFT 99'ER VERSION 2.1.2

```
ADDR  LABEL  OPCODE   OPERANDS   COMMENTS
7D14         MOVB     @>9802,@S1 GET MSB OF GROM ADDR INTO S1
             SWPB     @S1
             MOVB     @>9802,@S1 GET LSB OF GROM ADDR
             SWPB     @S1
             DEC      @S1        CORRECT FOR AUTO-INCREMENT
             LI       0,>1D00
             LI       1,PD
             LI       2,36
             BLWP     @>6028     WRITE PAB TO VDP RAM
             LI       6,>1D09
             MOV      6,@>8356   POINT TO DEVICE NAME LENGTH
             BLWP     @>6038     DSRLNK TO OPEN PRINTER
             DATA     8
             LI       10,>0400    <<** changed instruction **
             MOV      10,@>7DEA   <<** changed instruction **
                                  <<** deleted instruction **
7D52         LI       0,>1D00
 .            .        .
 .            .        .
 .            .        .
7DD2  L1     INC      3          POINT TO NEXT INPUT BYTE
             SRA      6,1        /2
             JGT      L2         DO NEXT BYTE, IF MORE
             SWPB     4          PUT OUTPUT BYTE IN MSB OF R4
             MOVB     4,@DO(8)   STORE AT DO
             INC      8          POINT TO NEXT BYTE OF DO
             SRA      5,1        /2
             JGT      L3         CONSTRUCT NEXT OUTPUT BYTE
             LI       0,>1D05
             LI       1,>0000     <<** changed instruction **
             BLWP     @>6024     PUT LENGTH OF 4 IN PAB
             LI       0,>1E00
             LI       1,E1
             LI       2,4
             BLWP     @>6028     PUT ESC K SEQ. IN DATA BUFF
             LI       6,>1D09
             MOV      6,@>8356   POINT TO DEVICE NAME LENGTH
             BLWP     @>6038     DSRLNK TO WRITE ESC K SEQ.
             DATA     8
             LI       10,>0000    <<** changed instruction **
             MOV      10, @>7DEA  <<** changed instruction **
                                  <<** deleted instruction **
             LI       0,>1D05
             LI       1,>0800
 .            .        .
 .            .        .
 .            .        .
7E78         LI       10,>0400    <<** changed instruction **
             MOV      10,@>7DEA   <<** changed instruction **
                                  <<** deleted instruction **
             JMP      L0         DO NEXT SCREEN CHARACTER
7EB2  L4     LI       0,>1D00    COME HERE WHEN FINISHED DUMP
 .            .        .
 .            .        .
 .            .        .
7ED2  PD     DATA     >0012,>1E00,>FF00,>0000,>001A
*                                PAB DEFINITION
             TEXT     'RS232.PA=0.DA=8.BA=9600.CR' <*change*>
*                                DEVICE NAME
7EF6  CR     DATA     >0D0A      CR LF
7EF8  F1     DATA     >1B4B,>FF00      <<** changed line **
*                                ESC K GRAPHICS SEQUENCE
7EFC  S1     BSS      2          SAVE AREA
7EFE  E2     DATA     >0D1B,>4108
*                                CR AND ESC A VERT SPACING
7F02         END
```

A Screen Dump Utility



After working with **Super Language: A Screen Dump Utility—Part 2** in the November 1982 issue, we came up with an improvement that we just had to pass along. The changes shown here, in the segments of **Listing #1** from that November article, cause the screen dump program to write one full screen line at a time to the printer. This really speeds up the dump and reduces the printer-head motion.

The original DEBUGs for Screen Dump which appeared in the December 1982 issue on page 40 should be ignored. The File Descriptor *should* be:

RS232.PA=0.DA=8.BA=9600

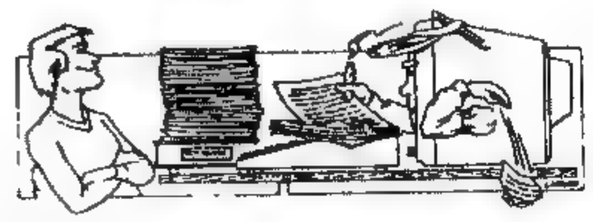
That part of the Screen Dump corrections having to do with an error on page 24 of the November issue (column 2 under **Mini-Memory Considerations** Step 5) should read as follows:

5. Put the entry point for DUMP into the DEF/REF table by entering the following lines:

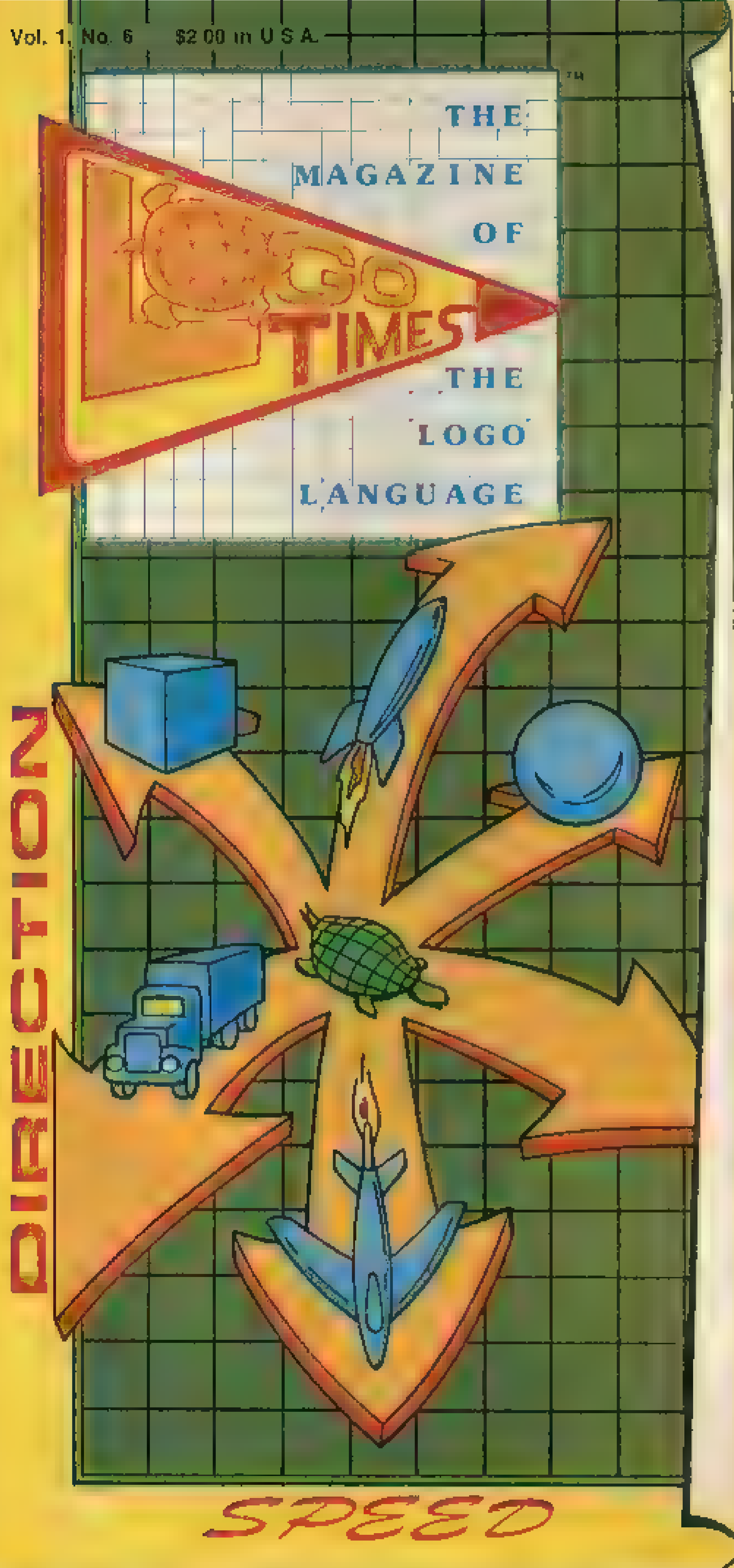
```
AORG >7FE8(CR)
TEXT 'DUMP  '(CR)
DATA >7D14(CR)
```

Note: There are 2 spaces required following the word DUMP in the above TEXT directive for a total of 6 characters within the apostrophes.

Tex-Scribe



A DEBUG in the **Tex-Scribe** article occured on page 16 of the December 1982 issue. Regarding **Table 2 "TI-99/4 Impact Printer Mode Commands,"** it was brought to our attention that the TI printer does not have an *Italics* mode. . . We designed that table using an *Epson MX-80 with Graftrax option* and mislabeled it. . . If you have the TI 99/4 Impact Printer, refer to your owner's manual for the available mode commands.



Vectors in LOGO: of Stars and Sprites

By Richard Bies

217 Park Entrance Dr. Pittsburgh, PA [illegible]

Vectors. Somewhere along the [illegible] toward an education [illegible] and certain[illegible] [illegible] the study of physics—the student encounters a mathematical concept called the vector. A vector is a quantity [illegible]

People analyze vectors [illegible] very while driving cars, hunting, or in other sports, but few apply mathematical solutions. [illegible] the amount of speed [illegible] depend on the amount of change in direction.

Our schools usually teach physics w[illegible] approach [illegible] the se[illegible] [illegible] which [illegible] the stu[illegible] [illegible] as strange and som[illegible] worthy of [illegible] Nevertheless [illegible] analysis [illegible] technology.

Within the traditional framework, schools were not necessarily [illegible] [illegible] tor analysis, which used to require trigonometry and/or Pythagorean calculation.

Why are vectors so important? Simply, they are so basic to modern technology. They're what space travel is all about—the cornerstone of future developments.

Back to Basics?

[illegible] processed information w[illegible] impact comparable to that of the printing press [illegible]

Unfortunately, ou[illegible] technology's challenge [illegible] by a movement [illegible] known as back-to-basics. [illegible] literacy but [illegible] as their battle cry the old [illegible] "Readin'," "R[illegible]n'," and "R[illegible]"

As [illegible] take over more and more tasks in the workplace, we frequently hear the quip, "You can be replaced by a [illegible] technological environment. But if the back-to-basics bunch gets its way and only basic arithmetic is taught, our students [illegible] already be[illegible] absurd to sugges[illegible] mathe[illegible]

Introduction

LOGO Times is an information resource for anyone interested in participating in the creation of their own *personal* language—one that will easily allow them to communicate with a computer in a totally new audiovisual realm of applied imagination, exploration, and self-discovery. The articles on these pages concern the use of the new TI LOGO language, but readers do *not* need any additional software or equipment (or even a computer) to understand and learn from the material presented here.

If readers want to actually *experience* a TI LOGO environment, they will need either a TI-99/4 or TI-99/4A computer, the Expansion Memory peripheral, and TI LOGO Command Cartridge. A disk drive, although convenient to have, is *not* required; a user's work may alternately be saved on cassette tape, printed out on the TI Thermal Printer, or hand copied into a notebook (for later re-keyboarding).

In each issue, one or more of the articles may reference or build upon the topics discussed in a previous article. It is therefore recommended that for maximum benefit and understanding, new readers obtain the appropriate back issues of *99'er Home Computer Magazine* containing *LOGO Times* articles.

NOTICE

LOGO Times is actively soliciting articles. Manuscripts should be typed double-spaced, and accompanied by a cassette tape or disk if containing any lengthy procedures or graphics.

Send all materials to:

LOGO Times Editorial Dept.
99'er Home Computer Magazine
1500 Valley River Dr., Suite 250
Eugene, OR 97401

All mail directed to the Letters-to-the-Editor column (*Letters on LOGO*) will be published in accordance with the conditions set forth on *99'er Home Computer Magazine's* Masthead page.

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struggle through arithmetic is a necessary prerequisite to higher mathematical thinking. After all, Einstein dropped out of basic arithmetic, but he managed to grasp a *few* of the principles of higher mathematics!

Because we face this backlash in education,[1] I cannot overemphasize the usefulness of TI LOGO for students coping with today's problems. Let me clarify this point by showing how well LOGO uses vector concepts.

A vector can be perfectly represented by a sprite. It has a given speed, in a given direction. With sprites, the vector's properties are graphically displayed on the screen. Through the use of TI LOGO, students can handle vectors at an early age, instead of waiting for high school or college.

For perspective, let us retreat for a moment to pre-sprite days: As vectors are both quantity and direction, their manipulation requires accounting for both. It doesn't work just to add the quantities and the directions.

The use of a direction implies a frame of reference, or coordinate system, which defines the vector. Typically the coordinate system is Cartesian, with an origin (0,0 position) on x and y axes. In Figure 1, the vector is graphically represented as an arrow with its length as the quantitative value.

The first step in manipulating the vector is to break it into components V_x and V_y along the two axes, that is with V_x and V_y related to the vector V as the sides to the hypotenuse of a right triangle. In Figure 2, it can be seen that if V_x and V_y are rearranged, they do indeed form a closed triangle:

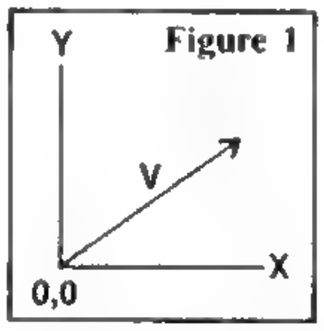


Figure 1

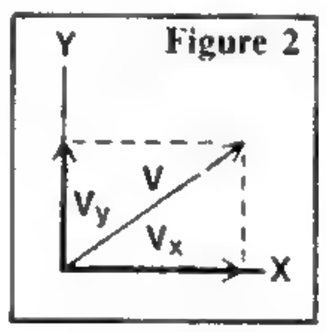


Figure 2

Alternatively the vector V is called the "resultant" of the two components. The tricky part is that getting the components from the vector requires the calculations:

V_y = V (quantitative value) x cos 0
V_x = V (quantitative value) x sin 0

or the vector from the components:

$$V = \sqrt{V_y^2 + V_x^2} \quad \arctan \frac{V_x}{V_y}$$

Note that I have used the angle from the y axis, rather than from the x axis as is often the case. I do this because the screen display defines "up" as North or 0°. Thus the angles in the LOGO display are measured from North, or the y axis. This may seem simple for engineers, but it's not elementary school arithmetic.

The LOGO Approach

Back to the present: What happens to these arcane calculations in TI LOGO? When you start a sprite, giving SETSPEED and SETHEADING you define the vector (quantity and direction). Then simply enter PRINT XVEL and PRINT YVEL and, there you have it, the x and y components displayed! Enter SXV (quantity) and SYV (quantity) and the vector is defined, while PRINT SPEED returns the resultant, and PRINT HEADING returns the direction. The power of this advanced concept is made available to the child without all the arithmetic computations.

Furthermore, adding vectors by components is simple:

SXV (XVEL + (quantity))
SYV (YVEL + (quantity))

Not only does SPEED and HEADING then return the vector result of the addition, but the effect is seen on the screen as well.

To add vectors directly does require a procedure, but it can be a simple one. Give the speed and direction to a second higher-numbered sprite (perhaps transparent), name its XVEL and YVEL, and pass the parameters to the lower-numbered sprites:

```
TO ADD
CS
PRINT [X & Y COMPONENTS: ]
PRINT NUMBEROF XVEL
PRINT NUMBEROF YVEL
MAKE "A XVEL
MAKE "B YVEL
VECTOR :A :B
END

TO RESOLVE
TELL 2
CARRY :BOX
SC 0
HOME
PRINT [ENTER THE SPEED AND
 HEADING]
PRINT [THEN ENTER ADD]
END

TO VECTOR :A :B
TELL 1
CARRY :BALL
SC :RED
HOME
SXV XVEL + :A
SYV YVEL + :B
PRINT [RESULT:]
PRINT [SPEED =] PRINT SPEED
PRINT [HEADING =] PRINT
 HEADING
RESOLVE
END

TO VECTORS
CALL 0 "A
CALL 0 "B
VECTOR :A :B
END
```

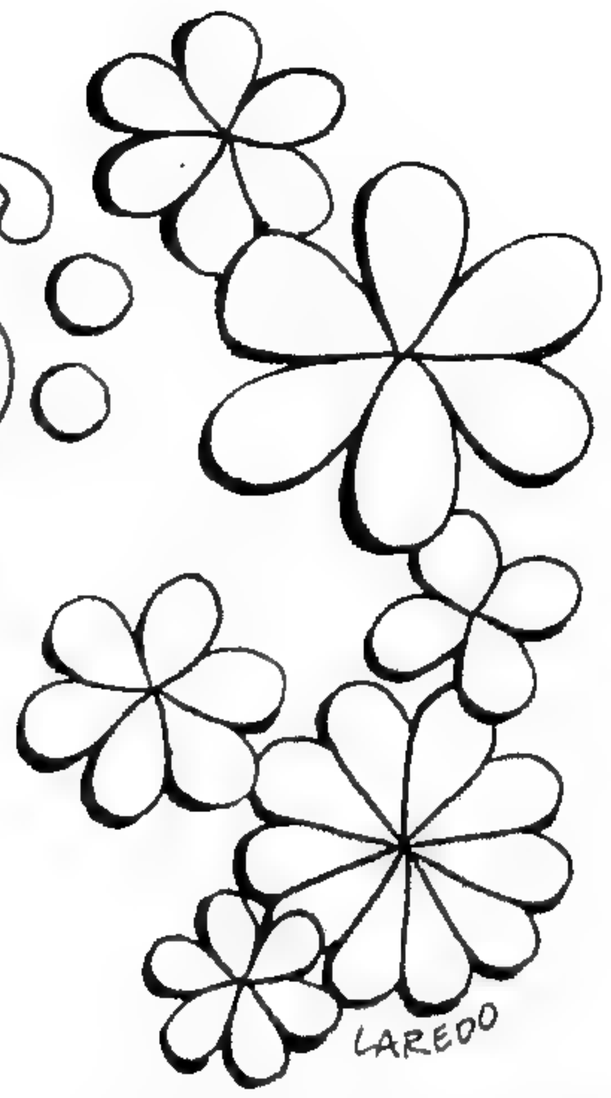
I will leave it to someone else to work out the multiplications (dot product and cross product).

Students who write programs in the *sprite mode*, will gain an intuitive understanding of vectors. These young people are growing up with the information-handling power of the computer at their fingertips, and they will live with a view of themselves from outside the world. They will have the power of the stars in their hands . . .

[1]For a view of mathematics today, see a booklet entitled *Agenda for the 80's* published by the National Association of Teachers of Mathematics. This publication recognizes that calculators and personal computers do exist, and that skill in hand manipulation of large numbers is no longer "basic"

DAISIES:

Math Flowers With LOGO



By Roger B. Kirchner
Contributing Editor

TI LOGO is a powerful language. Although it does not have floating point arithmetic, that capability can always be simulated. TI LOGO *can* have SIN and COS. One need only take advantage of the sprites.

The graph of the polar equation r = Acos(nt) will serve as our example. The graph is obtained by interpreting PHI as degrees from the vertical measured clockwise, and R as the distance from the origin in the direction of heading PHI. The graph is a circle when n = 1, has n loops when n is odd, and 2n loops when n is even. When filled in, the loops look like petals of a daisy. One might not suspect that these daisies can be graphed in TI LOGO, but try the following:

```
TO DAISIES
CS
CB 1
MAKE "N RANDOM + 1
TELL TURTLE
SC RANDOM + 2
MAKE "SIZE 45
TELL 0 SS :SIZE
TELL 1 SS 100
TEST :N / 2 * 2 = :N
IFT MAKE "ST 360
IFF MAKE "ST 180
PETAL :N 0 :ST
WAIT 120
DAISIES
END

TO PETAL :N :PHI :STOP
TELL 0
SH :N * :PHI
MAKE "R YVEL
TELL TURTLE
HT
HOME
SH :PHI
FD :R
IF :PHI = :STOP THEN STOP
PETAL :N :PHI + 1 :STOP
END
```

Typing DAISIES will graph a randomly colored daisy with 1, 3, 5, 7, 9, 4, 8, 12, 16, or 20 petals. After a two-second display of the daisy, another will be started. The procedure must be stopped with FCTN 9. Then enter CB 7 to change the screen from a black color back to cyan. The value of STOP will be 180 for :N odd, and 360 for :N even. (What if :STOP were equal to 360 for all cases? What would you observe?)

The value of R in DAISY is the y-component of the velocity of sprite 0, which had its speed set to 45 in DAISIES. (Different sized daisies can be graphed by changing the value of SIZE. But if :SIZE is much larger than 45, the daisies will wrap around to the top of the screen.) Since its heading is set to :N*:PHI, the value of its y-component is 45*COS(:N*:PHI). The daisy drawn thus has outline :R = 45*COS(:N*:PHI).

The following procedures compute :A*COS(:X) and :A*SIN(:X): (:X in degrees.)

```
TO COS :A :X
TELL 0
SS :A
SH :X
OUTPUT YVEL
END

TO SIN :A :X
TELL 0
SS :A
SH :X
OUTPUT XVEL
END
```

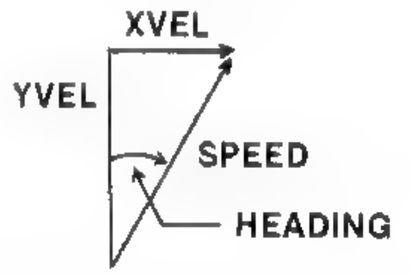
This method for computing SIN and COS can be understood by reviewing the LOGO commands having to do with motion.

SH n	sets heading of active sprite(s) (or turtle) to n degrees clockwise from the vertical
HEADING	returns the heading of active object.
SS s	sets speed of active sprite(s).
SPEED	returns speed of active sprite(s).
SXV xv	sets x-component of velocity to xv.
XVEL	returns x component of velocity.
SYV yv	sets y-component of velocity to yv.
YVEL	returns y-component of velocity.

The fundamental relationship is:

$SPEED^2 = XVEL^2 + YVEL^2$

Consider the case in which HEADING is between 0 and 90 degrees. Then XVEL and YVEL are positive, and we can visualize a triangle with hypontenuse SPEED and sides XVEL and YVEL:



From the definitions of COS and SIN, we see that:

COS(HEADING) = YVEL/SPEED,
SIN(HEADING) = XVEL/SPEED.

Thus:

YVEL = SPEED*COS(HEADING),
XVEL = SPEED*SIN(HEADING).

SIN and COS are defined so that these relations are true for all values of HEADING. Indeed, the purpose of SIN and COS is to make these relations hold. (The math textbook definition looks a little different, but that is because it measures angles counterclockwise from the horizontal, and we are measuring them clockwise from the vertical.)

This method does have a restriction which must be kept in mind: the sprites can have a speed no greater than 127. In DAISIES, the speed of sprite 0 was set to 45, but could not have been greater than 127. This means that the maximum length a petal can be is 127.

After enjoying DAISIES for a while, the reader may want to review the construction of the DYNATURTLE (Vol. 1, No. 4, pp 66-67.) The secret of the TI Dynaturtle is the use of sprites to compute sine and cosine.

Adventuring... from p.26

ject is still present, then you haven't left the room. Conversely, if the object isn't present, *you are in another room*! By dropping a few more objects and moving around, you can probably get out. What if you weren't carrying anything when you entered the room? Just restart the game (you *did* save it, didn't you?) at a point before you got lost, and pick up as much inventory as possible.

Computer Messages as Clues

When you try things that don't work out, pay attention to the computer's messages. They themselves may be clues. For example, a response like "THAT'S BEYOND MY POWER TO DO" means the thing is impossible. On the other hand, a message of "I CAN'T DO THAT . . . YET" means that you are on the right track but are missing some vital object (where did you drop that shovel?...you need it now!), or you neglected to do something (did you feed the piranhas?), or maybe you are in the wrong room (where is that map anyway?). Figure out what's wrong and then try it again.

The wording of a response can be significant. If you say HIT door and get the message "I DON'T KNOW HOW TO 'HIT' SOMETHING," it means that HIT is not a good word. If the message is "ITS IMPOSSIBLE", or something like that, it means that the word HIT is good, but not in this context. Write it down because somewhere or other you will probably have to HIT something.

Two messages are essential for all Scott Adams adventures in which you search for treasure. The first one tells you how to score points for finding the treasure, where to bring the treasure and what to say when you find it. Until you see this message, just save any treasure in a convenient location. The second message tells you how many treasures you are supposed to find. Sometimes you are not told outright how many different treasures there are. You have to figure it out. When you score a treasure, you learn how many points it is worth. Each is usually worth 100 divided by the number of treasures, so a treasure worth 6 points means there are 16 in all.

These rules should help you survive, but in a truly good adventure game you will still need that razor-sharp intellect!

Writing Your Own

Now, for those of you who want to try writing an adventure, I have a few rules you might follow. Who knows, you may be able to get it published in *99'er Magazine*! Just pay attention—this could be the break you need to get into print!

First, think of your scenario. Decide where and in what time period the adventure will take place. Once you decide, stick to it! Don't do anything out of context for the time and place you selected—for example, no ray guns in 19th century London.

Set up a theme. Decide what the adventurer is ultimately supposed to do. Is he to locate treasure? Maybe the idea is to catch Jack the Ripper? Perhaps to escape a locked building? Find a princess? How about saving a Mad Scientist's daughter?

Continued on p. 66

Chuck-A-Luck . . . from p.27

version, and lines 2750-3020 in the Extended BASIC version. For TI BASIC, this consists of a simple loop which displays at LOC_X and LOC_Y the appropriate DICE_PIP for each of the nine pieces. After the character on the last die is displayed, I wait a little while and then leave the routine.

Notice that in order to highlight the dice roll routine, I changed the color of the screen and added a little music. My "music jar" of melody listings borrowed from other programs gave up only one piece that remotely matched up with gambling, the "call to the post" tune played at the track just before a race. Perhaps you have a more fitting musical phrase.

The sprite version of the display routine is more complex than the HCHAR verison. I will go through it very carefully because Ron has some great ideas about controlling sprites. Note that this routine was written with multiple statements on each line. This has to be done to make your BASIC code run as fast as possible when handling sprites. Slow code at this point could make it very difficult to handle them smoothly.

Graphic Routines

If you have an interest in designing Extended BASIC programs with sprites, tracing through the following program will put you well on your way toward your own creative endeavors. All line numbers from this point on will refer to the Extended BASIC version only.

2750-2820 This code figures out the sprite number for each character of the die being displayed, and starts it out as a sprite with a random motion. Note that this motion can either be positive or negative so that we get them flying in all directions. We also set the LOC value for that character to zero, to show that we haven't yet moved the character back to its final location.

2840-2920 This routine uses a variable called CNT to keep track of the number of characters moved back to their starting locations. If this number is low enough, we will randomly choose the character we work on. If CNT is 21 or greater, however, we won't choose the character randomly. We'll just look through the LOC array sequentially to find the first character that we haven't yet moved back to its location (i.e., its LOC has a zero in it).

Why is Ron going through the trouble of doing it this way? The answer requires a little thought. Suppose we just randomly kept choosing a figure. By the time 20 or so characters have been reset to the final location, the odds on randomly selecting a good character will then be 7/27 or 26%. The odds on the next selection being a good character will then be 6/27 and they keep getting smaller and smaller. With one character left, the odds on hitting it randomly are 1/27 or less than 4%. As you can see, it is very unlikely that you will hit a good character when only a few are left. To prevent a long wait until the computer randomly locates a good character, he set up his code so that the last 7 or so sprites will not be randomly chosen. Of course, he is also checking CNT to see if he has finished with all 27 characters.

2930-2980 This part of the routine takes the selected character, changes its color to black (to highlight it on the screen while we play with it) and freezes it momentarily. That is what the CALL MOTION(#1,0,0) is for. The major problem in sprite handling is that they keep moving at a pretty high speed, while BASIC keeps plodding along with old data. Ron prevents this problem by freezing the sprite before finding its location. This means that he gets *accurate* data via the CALL POSITION code.

After locating the sprite, he computes the velocities needed to move it back to its original (and final) location. The Extended BASIC reference manual talks about row velocities and column velocities, but what it doesn't explicitly tell you is that you can control the direction of the sprite. For example, to move at a 45 degree angle, both the row and column velocities must be equal. To move at a 30 degree angle, just make the column velocity equal to twice

Continued on p. 52

*Ad placed this way on advertiser request.

Chuck-A-Luck . . . from p.51

the row velocity. Ron is using this fact in statement 2960 to figure out how far the sprite is, vertically and horizontally, from where it is supposed to go. He calculates this in MY and MX respectively. He then adds the two to get a value called TOT. The distances can be positive or negative depending on the sprite's location relative to its final position—left or right, above or below.

In order to get a good value of TOT, we have to ignore the signs of the distances. In other words, we don't care if the number is positive or negative, as long as we know its *absolute* value. We find it with the ABS function. By making the row and column velocities a function of both the distance it has to go (MY or MX) and the TOT value, the sprite can be directed to travel in the right direction. Take a look at the last statement in line 2960. It uses the MAX function available in Extended BASIC. TOT must be a reasonable size number, because we will divide MY and MX by TOT to get our velocities. Since it is possible for the sprite to be right where it should be, TOT can be zero. If you divide by 0, however, your program will stop with an error. To make sure that TOT has a value of at least one, you would normally code in something like this:

```
xxxxx TOT=ABS(MX)+ABS(MY)
yyyyy IF TOT<1 THEN TOT=1
zzzzz
```

This can be done just as easily with the MAX function which gives me the higher of the two alternatives. If one is greater, it will return me a 1. On the other hand, if the result of the addition is greater than 1, it will return that number to me. Using the MAX function eliminates the need for an IF statement right in the middle of my code. MAX (along with its cousin, the MIN function) is a handy feature of Extended BASIC that can save you a lot of coding trouble. We now use the values that we just computed to set the sprite moving again using a CALL MOTION.

2990-3010 I have also set a new variable (my, we are collecting a whole slew of them now!) called CHK to be equal to zero. This counter will be used to make sure that we don't try the next lines of code more than 10 times before we give up and refigure a new MOTION command. If we haven't tried it more than 10 times, we do a CALL COINC to see if the sprite has reached its goal. If not (HIT=0) we go back and do it again. If the sprite has reached its final location, Ron stops it with a CALL MOTION, and does a CALL LOCATE to make sure it is being stopped exactly where he wants it. This is necessary because a sprite that keeps moving between the CALL COINC and the final CALL MOTION may no longer be in the right spot. He changes the color back to white.

3020-3920 This code checks to see if we finished all the characters, and restarts the process if we haven't. It then changes the screen back to green. It also issues a CALL DELSPRITE which clears the sprite characters from the screen.

Protection and Improvement

We have now finished the Extended BASIC version of the code. Our game gets a final debugging and is ready to go! The next step is just some administrative work to make sure that your effort will not be in vain. First, change the REM statement at the beginning of the program so that it says FINAL VERS.ON as well as the version number. Next, save it on cassette tape or disk. Label the tape or disk with the name of the program, the date, and the version number along with the words FINAL VERSION. Make two copies. If you are saving on tape, make one copy on each side and verify both. Then make another copy on a backup tape. You should always have a backup tape kept separately from your original master copies. Remove the tabs in the back of the tape to prevent accidental erasures. For disks, add the write-protect tab. Make a backup disk. Keep it separate from your regular disks. Then enjoy the fruits of your labor!

99'er

```
60 REM    ***  CHUCK-A-LUCK  ***
70 REM    *   EXTENDED BASIC   *
80 REM    *    BY SAM PINCUS   *
90 REM    *99ER VERSION 2.2.1XB*
100 DIM DICE_VALUE(3),PLAYER_NAME$(
    4),PLAYER_CASH(4),PLAYER_BET(4)
    ,PLAYER_DICE(4)
110 DIM DICE_PIP(9,9),LOC_X(27),LOC
    Y(27)
120 DIM LOC(27)
130 RANDOMIZE
160 GOSUB 20000
170 REM BETTING LOOP
200 REM GET BET
210 GOSUB 1200
220 REM THROW DICE
230 GOSUB 2000
240 REM UPDATE CASH BALANCE
250 FOR I=1 TO PLAYERS
260 IF PLAYER_CASH(I)=0 THEN 760
280 PRINT "";PLAYER_NAME$(I);", YOU
    BET ON";PLAYER_DICE(I);"FOR";P
    LAYER_BET(I);"DOLLAR";
290 IF PLAYER_BET(I)<2 THEN 310
300 PRINT "S";
310 PRINT "."
320 WIN=0
330 FOR J=1 TO 3
540 IF PLAYER_DICE(I)<>DICE_VALUE(J
    )THEN 560
550 WIN=WIN+1
560 NEXT J
570 IF WIN=0 THEN 690
580 WIN=WIN*PLAYER_BET(I)
590 PRINT "YOU ";"WIN";WIN;"DOLLAR"
    ;
600 IF WIN<2 THEN 620
610 PRINT "S";
620 PRINT "."
630 PLAYER_CASH(I)=PLAYER_CASH(I)+W
    IN
640 PRINT "YOU NOW HAVE";PLAYER_CAS
    H(I);"DOLLAR";
650 IF PLAYER_CASH(I)<2 THEN 670
660 PRINT "S";
670 PRINT "."
680 GOTO 760
690 PRINT "YOU LOST";PLAYER_BET(I);
    "DOLLAR";
700 IF PLAYER_BET(I)<2 THEN 720
710 PRINT "S";
720 PRINT "."
730 PLAYER_CASH(I)=PLAYER_CASH(I)-P
    LAYER_BET(I)
740 IF PLAYER_CASH(I)>0 THEN 640
```

Continued on p. 54

Chuck-A-Luck . . . from p.53

```
750 PRINT "YOU ARE BANKRUPT!"
760 NEXT I
770 REM CHECK FOR END OF GAME
780 GOSUB 5000
790 IF NO_LEFT>1 THEN 970
800 INPUT "WANT TO PLAY AGAIN (Y/N)
    ?";A$
810 A$=SEG$(A$,1,1)
820 IF A$<>"Y" THEN 850
830 GOSUB 22000
840 GOTO 200
850 IF A$<>"N" THEN 880
860 PRINT "THANK YOU FOR PLAYING.":
    "";""
870 STOP
880 PRINT PL$
890 GOTO 800
970 FOR I=1 TO 600
980 NEXT I
990 GOTO 200
1200 CALL CLEAR
1210 FOR I=1 TO PLAYERS
1220 IF PLAYER_CASH(I)=0 THEN 1500
1230 ON INT(RND*4+1)GOTO 1240,1260,
     1280,1300
1240 PRINT "NOW, ";
1250 GOTO 1350
1260 PRINT "OK, ";
1270 GOTO 1350
1280 PRINT "ALRIGHT, ";
1290 GOTO 1350
1300 PRINT "YOUR TURN, ";
1350 PRINT PLAYER_NAME$(I);","
1360 PRINT "YOU HAVE";PLAYER_CASH(I
     );"DOLLAR";
1370 IF PLAYER_CASH(I)<2 THEN 1390
1380 PRINT "S";
1390 PRINT ".":"WHAT'S YOUR BET? "
1400 INPUT PLAYER_BET(I)
1410 IF PLAYER_BET(I)<1 THEN 1450
1420 IF PLAYER_BET(I)>PLAYER_CASH(I
     )THEN 1450
1430 IF PLAYER_BET(I)>50 THEN 1450
1440 IF INT(PLAYER_BET(I))=PLAYER_B
     ET(I)THEN 1470
1450 PRINT "THAT'S NOT POSSIBLE."
1460 GOTO 1230
1470 PRINT "WHAT NUMBER WILL YOU BE
     T ON?"
1480 INPUT PLAYER_DICE(I)
1490 IF INT(PLAYER_DICE(I))<>PLAYER
     _DICE(I)THEN 1520
1500 IF PLAYER_DICE(I)<1 THEN 1520
1510 IF PLAYER_DICE(I)<7 THEN 1540
1520 PRINT "TRY AGAIN."
1530 GOTO 1470
1540 NEXT I
1550 RETURN
2000 REM
2010 CALL CLEAR
2020 CALL SCREEN(10)
2030 FOR I=1 TO PLAYERS
2035 GOSUB 28000
2040 ROW=(I-1)*5+1
2060 DISPLAY AT(ROW,15):PLAYER_NAME
     $(I)
2160 DISPLAY AT(ROW+1,15):"BET  $";
     STR$(PLAYER_BET(I))
2260 DISPLAY AT(ROW+2,15):"CASH $";
     STR$(PLAYER_CASH(I))
2350 DISPLAY AT(ROW+3,15):"DIE-  ";
     STR$(PLAYER_DICE(I))
2370 NEXT I
2500 FOR I=1 TO 3
2510 DICE_VALUE(I)=INT(RND*6)+1
2520 NEXT I
2600 REM DISPLAY DICE
2610 FOR I=1 TO 3
2620 CHAR_NO=DICE_VALUE(I)
2630 IF CHAR_NO=1 THEN 2740
2640 IF CHAR_NO=4 THEN 2740
2650 IF CHAR_NO=5 THEN 2740
2660 IF RND<.5 THEN 2740
2670 IF CHAR_NO<>2 THEN 2700
2680 CHAR_NO=7
2690 GOTO 2740
2700 IF CHAR_NO=6 THEN 2730
2710 CHAR_NO=8
2720 GOTO 2740
2730 CHAR_NO=9
2740 REM DISPLAY A DIE
2750 FOR J=1 TO 9
2760 K=(I-1)*9+J
2780 CALL SPRITE(#K,96+DICE_PIP(CHA
     R_NO,J),16,LOC_X(K),LOC_Y(K),R
     ND*120-60,RND*120-60)
2800 LOC(K)=0
2820 NEXT J
2830 NEXT I
2840 CNT=0
2850 IF CNT<21 THEN 2900
2860 FOR I=1 TO 27 :: IF LOC(I)=0 T
     HEN 2920
2870 NEXT I :: GOTO 3800
2900 I=INT(RND*27)+1
2910 IF LOC(I)=1 THEN 2900
2920 LOC(I)=1 :: CNT=CNT+1
2930 CALL COLOR(#I,2):: CALL SOUND(
     -1,110,0,165,1,220,2)
2940 CALL MOTION(#I,0,0):: CHK=0
2950 CALL POSITION(#I,Y,X)
2960 MY=LOC_Y(I)-Y :: MX=LOC_X(I)-X
      :: TOT=MAX(1,ABS(MY)+ABS(MX))
2980 CALL MOTION(#I,MY*50/TOT,MX*50
     /TOT)
2990 CHK=CHK+1 :: IF CHK>10 THEN 29
     40
3000 CALL COINC(#I,LOC_Y(I),LOC_X(I
     ),20,HIT):: IF HIT=0 THEN 2990
3010 CALL MOTION(#I,0,0):: CALL LOC
     ATE(#I,LOC_Y(I),LOC_X(I)):: CA
     LL COLOR(#I,16):: CALL SOUND(-
     1,1111,0)
```

Chuck-A-Luck

```
3020 IF CNT<27 THEN 2850
3800 FOR I=1 TO 400
3810 NEXT I
3900 CALL SCREEN(4)
3910 CALL DELSPRITE(ALL):: CALL CLE
     AR
3920 RETURN
4990 REM CHECK FOR A WINNER
5000 NO_LEFT=0
5010 FOR I=1 TO PLAYERS
5020 IF PLAYER_CASH(I)=0 THEN 5050
5030 NO_LEFT=NO_LEFT+1
5040 LAST_PLAYER=I
5050 NEXT I
5060 IF NO_LEFT>0 THEN 5200
5100 PRINT "NO ONE IS LEFT.":"THE G
     AME ENDS IN A TIE."
5110 GOTO 5400
5200 IF NO_LEFT>1 THEN 5400
5300 PRINT PLAYER_NAME$(LAST_PLAYER
     );" WINS!"
5400 RETURN
20000 PL$="PLEASE ANSWER THE QUESTI
      ON"
20010 CALL CHAR(96,"FFFFFFFFFFFFFFF
      F")
20020 CALL CHAR(97,"FFFFFFE7E7FFFFF
      F")
20030 CALL COLOR(9,2,16)
20050 CALL CLEAR
20090 ROW=12
20100 FOR I=1 TO 9
20110 FOR J=1 TO 9
20120 READ DICE_PIP(I,J)
20130 NEXT J
20140 IF INT(I/2)=I/2 THEN 20170
20150 MSG$="CHUCK-A-LUCK"
20160 GOTO 20180
20170 MSG$="              "
20180 DISPLAY AT(ROW,14):MSG$
20200 NEXT I
20300 CNT=0
20310 FOR I=1 TO 3
20320 FOR J=1 TO 3
20330 FOR K=1 TO 3
20340 CNT=CNT+1
20350 LOC_Y(CNT)=(J+I*4)*8
20370 LOC_X(CNT)=(K+2)*8
20400 NEXT K
20410 NEXT J
20420 NEXT I
21000 CALL CLEAR
21010 INPUT "NEED INSTRUCTIONS (Y/N
      )? ":A$
21020 A$=SEG$(A$,1,1)
21030 IF A$="Y" THEN 21100
21040 IF A$="N" THEN 22000
21050 PRINT PL$
21060 GOTO 21010
21100 PRINT :"":"":"WELCOME TO THE
      GAME OF":"   CHUCK-A-LUCK!":""
21110 PRINT "THIS GAME CAN BE PLAYE
      D BY":"1 TO 4 PLAYERS. EACH P
      LAYER STARTS OUT WITH $500. F
      OR"
21120 PRINT "EVERY TURN, EACH PLAYE
      R BETSFROM $1 TO $50 ON A DIC
      E    VALUE FROM 1 TO 6. THREE
      "
21130 PRINT "DICE ARE THEN ROLLED.
      EACH  PLAYER WILL THEN RECEIV
      E AN AMOUNT EQUAL TO HIS BET"
21140 PRINT "MULTIPLIED BY THE NUMB
      ER OF TIMES THE VALUE HE SELE
      CTED CAME UP. IF NO DIE HAS T
      HE"
21150 PRINT "VALUE SELECTED, THE PL
      AYER  LOOSES HIS BET. A PLAYE
      R WHOGOES BANKRUPT IS OUT OF
      THE"
21160 PRINT "GAME. THE GAME IS OVER
       WHEN ONLY 1 PLAYER REMAINS.
      IF NOONE REMAINS, THERE IS NO
      "
21170 PRINT "WINNER. ":""
21500 FOR I=1 TO 1000
21510 NEXT I
22000 INPUT "HOW MANY PLAYERS (2-4)
      ? ":PLAYERS
22010 IF PLAYERS<2 THEN 22060
22020 IF PLAYERS>4 THEN 22060
22030 IF INT(PLAYERS)=PLAYERS THEN
      22100
22060 PRINT PL$
22070 GOTO 22000
22100 FOR I=1 TO PLAYERS
22110 PRINT "PLAYER NUMBER";I;"ENTE
      R YOUR"
22120 INPUT "NAME-":PLAYER_NAME$(I)
22140 IF PLAYER_NAME$(I)<>"" THEN 2
      2250
22170 PRINT PL$
22180 GOTO 22110
22250 PLAYER_NAME$(I)=SEG$(PLAYER_N
      AME$(I),1,10)
22310 PLAYER_CASH(I)=500
22320 NEXT I
22330 RETURN
25000 DATA 0,0,0,0,1,0,0,0,0
25010 DATA 1,0,0,0,0,0,0,0,1
25020 DATA 1,0,0,0,1,0,0,0,1
25030 DATA 1,0,1,0,0,0,1,0,1
25040 DATA 1,0,1,0,1,0,1,0,1
25050 DATA 1,1,1,0,0,0,1,1,1
25060 DATA 0,0,1,0,0,0,1,0,0
25070 DATA 0,0,1,0,1,0,1,0,0
25080 DATA 1,0,1,1,0,1,1,0,1
25090 DATA X
28000 T2=700 :: T=120
28010 CALL SOUND(T,392,1)
28020 CALL SOUND(T,523,1)
```

Continued on p. 63

ASPIC*

A Language for Teachers

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***Amateur's Special Purpose Instructional Code**

In last November's issue of *99'er Magazine*, we introduced ASPIC, a simple language for doing arithmetic and graphics. ASPIC was designed primarily for children, but it can be valuable for teachers as well. They will find it an easily accessible language for designing their own software.

In this issue we offer four more examples any teacher can program. First is a drill similar to multiplication drills found in commercial software packages.

DRILL

```
10 PRINT "HOW MANY PROBLEMS"
20 ASK FOR N
30 CLEAR
40 LET RIGHT = 0
50 LET A=12
60 LET B=12
70 REPEAT N
80 PRINT A
90 PRINT "X"
100 PRINT B
110 ASK FOR ANS
120 IF ANS=A*B THEN
130 PRINT "VERY GOOD!"
140 SOUND
150 LET RIGHT=RIGHT+1
160 ELSE
170 PRINT "INCORRECT"
180 PRINT "THE ANSWER IS"
190 PRINT A*B
200 END
210 PRINT " "
220 LET A=A+7
230 IF A>12 THEN
240 LET A=A-12
250 END
260 LET B=B+7
270 IF B>11 THEN
280 LET B=B-11
290 END
300 END
310 PRINT "YOU CORRECTLY
    ANSWERED"
320 PRINT RIGHT
330 PRINT "OUT OF"
340 PRINT N
```

In lines 10-30, the user selects a number of problems from 1 to 132. If a number larger than 132 is put in, the problems will repeat. Lines 40-60 are used for RIGHT, which keeps track of the number of correct answers, and A and B, which will be the multiplier and multiplicand. Lines 80-100 print the problem. Lines 110-200 check the student's response and offer either a reward or a correction. Notice how the "IF . . . THEN . . . ELSE" construction makes the logic clear. Lines 210-300 prepare the next problem, and because ASPIC has no random number generator, we use a mathematical trick: The number 7 has no common factor with either 12 or 11, and therefore keeps the problems from repeating while making them seem in random order. The last few lines of the program give a score for the session.

The program certainly could be written in another language, and if copied verbatim in BASIC, it would be more attractive on the screen. The advantage of ASPIC is that a teacher with no previous programming experience could tailor the lessons to individual needs. For example, the teacher might want to limit the problems to the 1-through-6 times tables. Even simpler would be to change from multiplication to addition. The teacher might want to vary specific numbers to emphasize a single fact table. All these changes and more are easy with ASPIC.

ASPIC Graphics

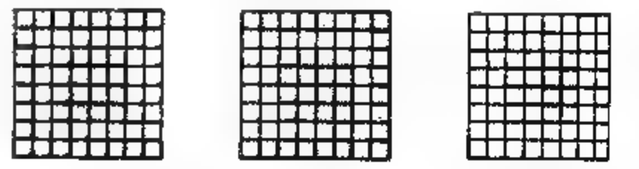
Our second example shows how to exploit the graphics capabilities of ASPIC. This program distinguishes between even and odd numbers by grouping boxes in pairs. It also displays graphically the nature of even and odd numbers.

EVEN–ODD

```
10 MAKE LEFT
20 MAKE RIGHT
30 MAKE SQ
40 PRINT "HOW MANY NUMBERS?"
50 ASK FOR N
60 CLEAR
70 REPEAT N
80 ASK FOR NUM
90 DRAW (NUM ACROSS) SQ IN
    ROW#20 COL#3
100 DRAW (128 ACROSS) BL IN
    ROW#21 COL#1
110 LET C=3
120 REPEAT UNTIL NUM<2
130 DRAW LEFT IN ROW#20 COL#C
140 DRAW RIGHT IN ROW#20 COL#C+
150 LET C=C+2
160 LET NUM=NUM-2
170 END
180 IF NUM=1 THEN
190 DRAW BL IN ROW#20 COL#C
200 DRAW SQ IN ROW#20 COL#30
210 END
220 END
```

The first three commands are used to make the shapes below; they are needed later in the program.

LEFT RIGHT SQ



Lines 40-60 ask how many numbers you wish to examine. Lines 70-220 repeat the following procedure for each number examined:

ASPIC In a Nutshell

Amateur's Special Purpose Instruction Code is a language designed for children, using a logic consistent with a child's way of thinking. Doctors Berner and Martin, in working to help schools find more effective ways of using computers in education, found the BASIC language too complex for children. It was a difficult language for young students to learn, and one which kept slipping away from those whose time at the computer was limited to a session or two per week. To overcome these obstacles, the two educators created ASPIC.

With a few simple commands such as MAKE and DRAW, the children can create shapes on the screen and assign colors to them. These programs help children understand concepts such as constants, variables, *and plotting* with a simple coordinate system.

ASPIC is easy for children to use, and easy for teachers to program—even teachers who have had virtually no experience with computers. For complete instructions, see *99'er Home Computer Magaine*, Nov 1982, pp. 64-67.

The number is asked for in Line 80 and an equal number of squares drawn (Lines 90-100). Lines 110-170 place brackets around the boxes in groups of two. Lines 180-210 determine if there is an unbracketed box, i.e., if the number is odd. If so, it's "snot" to the far right of the screen.

At the end, it is easy to tell whether the sum of all entries is even or odd by mentally pairing up the "extras" on the right side of the screen. This program makes it easy to visualize the theorem that a sum is odd whenever there is an odd number of odd addends. Computer graphics make tangible a concept that is usually treated abstractly. The "shooting" of the extra box is an image that sticks with children and brings the mathematical concepts and theorems to life.

The power of ASPIC comes through in the structure of the program. The writing of the program reflects one way of thinking about even and odd numbers. No technical jargon or obscure symbolism distracts from the thought. The program's "chunks" correspond to thought patterns that clearly follow the problem.

The third example is another program that uses graphics to illustrate a concept—in this case, "square" numbers. However, the main purpose of this example is to show how the LOOK command can control the pace of instruction.

SQUARES

```
 10 MAKE REDBOX
 20 MAKE BLUEBOX
 30 MAKE YELLOWBOX
 40 COLOR REDBOX RED
 50 COLOR BLUEBOX BLUE
 60 COLOR YELLOWBOX YELLOW
 70 DRAW BOX IN ROW#12 COL#16
 80 LET LOOK=0
 90 REPEAT UNTIL LOOK=1
100 LOOK
110 END
120 DRAW (2 DOWN) REDBOX IN
     ROW#12 COL#17
130 DRAW (2 ACROSS) REDBOX IN
     ROW#13 COL#16
140 LET LOOK=0
150 REPEAT UNTIL LOOK=1
160 LOOK
170 END
180 DRAW (3 DOWN) BLUEBOX IN
     ROW#12 COL#18
190 DRAW (3 ACROSS) BLUEBOX IN
     ROW#14 COL#16
200 LET LOOK=0
210 REPEAT UNTIL LOOK=1
220 LOOK
230 END
240 DRAW (4 DOWN) YELLOWBOX IN
     ROW#12 COL#19
250 DRAW (4 ACROSS) YELLOWBOX
     IN ROW#15 COL#16
```

Lines 10-60 simply construct and color the boxes used in the rest of the program. Line 70 draws a black box (a 1 × 1 square) in the middle of the screen. (Notice that shapes are colored BLACK by default.) Lines 80-110 illustrate the use of LOOK. Nothing will happen on the screen until a key is pressed, and perhaps held for a

second or two. Lines 120 and 130 draw boxes around the edge to make a 2×2 square. The rest of the program alternates between waiting (Lines 140-170 and Lines 200-230) and drawing the next "square" number by adding an odd number of boxes around the edges (Lines 180-190 and 240-250).

Notice the word "LOOK" has two meanings in ASPIC. In Lines 80 and 90, it is a variable. In Line 100, it is a command that checks whether a key is down; if so, the *variable* LOOK is assigned 1; otherwise the variable LOOK is assigned 0. Thus the loop in Lines 90-110 (and in corresponding places later in the program) is executed until a key is pressed. When the loop is finished, LOOK has the value 1. Thus it must be re-assigned 0 (Lines 140 and 200) in order to use the procedure again.

Making Math Concepts Concrete

This program's overlapping boxes help children to see that "square" numbers are the sums of consecutive odd numbers. To make the next larger "square" number, you add one to the number in the side of the current square; then double that (for the row and the column) and subtract one (the overlapping box).

```
1 = 1
1 + 3 = 4
1 + 3 + 5 = 9
1 + 3 + 5 + 7 = 16
```

Another way to enlarge the square is to add the next larger row, but fill in the column without the overlap. The odd number is then seen as the sum of two consecutive numbers. What advantage does the computer program have over some tangible device—such as a flannel board or graph paper? Because the squares on the screen are not physical objects, the children must use their imagination to switch back and forth between the two ways of looking at the odd numbers (e.g., 5 is both 2 × 3 − 1 and 3 + 2). Such a program helps students to see one idea from different points of view.

The extensive use of string variables in the translation from ASPIC to BASIC causes ASPIC programs to run slowly. In *Even—Odd* and *Squares*, this slowness is not problematic. Rather, it allows time to point things out and to discuss the concepts involved. It lets the children observe the process by which the concepts were built and the illustrations drawn. Were the language not slow, delays would have to be built into the programs. This raises a question of programming: When should computer assisted instruction focus on process and when on product? *Even—Odd* and *Squares* teach by calling attention to the process, so it is important to slow it down. *Drill* (above) and *Nines* (following) are more concerned with product. Therefore, slowness is not inherently valuable.

Nines is a program that allows school children to use the computer as a data-gathering device. The research is directed toward solving the question:

How long a string of 9's do you need before a number is divisible by a given quantity? For example, 999 is divisible by 37, and 999999 is divisible by 7. Is there

Continued on p 67

BLOCKADE... from p.39

```
1000 GOTO 940
1010 GOSUB 2560
1020 GOSUB 2410
1030 CALL KEY(KBD,KEY,STAT)
1040 IF STAT<>0 THEN 1080
1050 GOSUB 2660
1060 CALL KEY(KBD,KEY,STAT)
1070 IF STAT=0 THEN 750
1080 IF (KEY=32)*(SHOTS=0)THEN 1050
1090 IF KEY=32 THEN 1030
1100 CALL SOUND(90,-7,16)
1110 IF (KEY<13)+(KEY>159)THEN 1030
1120 IF (KEY>13)*(KEY<33)THEN 1030
1130 REM  ***IMPACT GRAPHIC
1140 CALL GCHAR(R(KEY),CL(KEY),CODE
     )
1150 CALL HCHAR(R(KEY),CL(KEY),136)
1160 CALL HCHAR(R(KEY),CL(KEY),CODE
     )
1170 GOSUB 2220
1180 IF (CODE>33)*(CODE<38)THEN 124
     0
1190 SHOTS=SHOTS+1
1200 IF SHOTS<LIM THEN 1030
1210 GOSUB 2510
1220 GOTO 750
1230 REM  ***TEST FOR HIT
1240 IF CODE=34 THEN 1340
1250 IF CODE=35 THEN 1400
1260 IF CODE=36 THEN 1460
1270 REM  **SHIP DESTRUCTION
1280 CALL HCHAR(T4,D,GRF(1))
1290 CALL HCHAR(T4,D-2,GRF(2),5)
1300 GOSUB 2130
1310 CALL HCHAR(T4,1,32,32)
1320 D=3
1330 GOTO 750
1340 CALL HCHAR(T1,A,GRF(1))
1350 CALL HCHAR(T1,A-2,GRF(2),5)
1360 GOSUB 2130
1370 CALL HCHAR(T1,1,32,32)
1380 A=3
1390 GOTO 750
1400 CALL HCHAR(T2,B,GRF(1))
1410 CALL HCHAR(T2,B-2,GRF(2),5)
1420 GOSUB 2130
1430 CALL HCHAR(T2,1,32,32)
1440 B=3
1450 GOTO 750
1460 CALL HCHAR(T3,C,GRF(1))
1470 CALL HCHAR(T3,C-2,GRF(2),5)
1480 GOSUB 2130
1490 CALL HCHAR(T3,1,32,32)
1500 C=3
1510 GOTO 750
1520 END
1530 REM ***INCREMENT SHIPS
1540 RANDOMIZE
1550 A=A+INT(2*RND)+1
1560 B=B+INT(3*RND)+1
1570 C=C+INT(3*RND^3)+1
1580 D=D+INT(3*RND^3)+1
1590 IF (A>28)+(B>28)+(C>28)+(D>28)
     THEN 1700
1600 ON INT(5*RND^3)+1 GOTO 1610,16
     20,1640,1660,1680
1610 RETURN
1620 A=A+1
1630 GOTO 1590
1640 B=B+INT(2*RND)+1
1650 GOTO 1590
1660 C=C+1
1670 GOTO 1590
1680 D=D+1
1690 GOTO 1590
1700 IF A>28 THEN 1750
1710 IF B>28 THEN 1770
1720 IF C>28 THEN 1790
1730 D=3
1740 GOTO 1800
1750 A=3
1760 GOTO 1800
1770 B=3
1780 GOTO 1800
1790 C=3
1800 ESC=ESC+1
1810 GOTO 1590
1820 REM ***DISPLAY SHIPS
1830 CALL HCHAR(T1,1,32,A-2)
1840 CALL HCHAR(T1,A+1,33)
1850 CALL HCHAR(T1,A,34)
1860 CALL HCHAR(T1,A-1,38)
1870 CALL HCHAR(T1,A+2,32,31-A)
1880 IF (A<5)+(A>28)THEN 1900
1890 CALL HCHAR(SCP1,SCP(A),GRF(13))
1900 CALL HCHAR(T2,1,32,B-2)
1910 CALL HCHAR(T2,B+1,33)
1920 CALL HCHAR(T2,B,35)
1930 CALL HCHAR(T2,B-1,39)
1940 CALL HCHAR(T2,B+2,32,31-B)
1950 IF (B<5)+(B>28)THEN 1970
1960 CALL HCHAR(SCP2,SCP(B),GRF(13))
1970 CALL HCHAR(T3,1,32,C-2)
1980 CALL HCHAR(T3,C+1,33)
1990 CALL HCHAR(T3,C,36)
2000 CALL HCHAR(T3,C-1,40)
2010 CALL HCHAR(T3,C+2,32,31-C)
2020 IF (C<5)+(C>28)THEN 2040
2030 CALL HCHAR(SCP3,SCP(C),GRF(13))
2040 CALL HCHAR(T4,1,32,D-2)
2050 CALL HCHAR(T4,D+1,33)
2060 CALL HCHAR(T4,D,37)
2070 CALL HCHAR(T4,D-1,41)
2080 CALL HCHAR(T4,D+2,32,31-D)
2090 IF (D<5)+(D>28)THEN 2110
2100 CALL HCHAR(SCP4,SCP(D),GRF(13))
2110 RETURN
2120 REM **EXPLOSION
2130 CALL SCREEN(7)
2140 CALL SCREEN(11)
```

Continued on p. 60

BLOCKADE . . . from p.59

```
2150 CALL SCREEN(5)
2160 CALL SOUND(100,-7,12,110,24,12
     0,26,140,28)
2170 CALL SOUND(800,-7,22,110,28)
2180 CALL SCREEN(2)
2190 TOTAL=TOTAL+1
2200 RETURN
2210 REM ***FLASH
2220 CALL SCREEN(7)
2230 CALL SCREEN(2)
2240 CALL SOUND(50,-7,26)
2250 RETURN
2260 REM ***SET UP SCREEN
2270 CALL CLEAR
2280 CALL SCREEN(2)
2290 GOSUB 2460
2300 GOSUB 2560
2310 CALL HCHAR(21,1,42,128)
2320 PRINT "*firing'************LOA
     DING*"
2330 PRINT "*'mode''***************
     *****"
2340 PRINT "*engaged***************
     *****"
2350 PRINT : : : : :
2360 CALL HCHAR(19,1,42,192)
2370 CALL VCHAR(13,2,42,12)
2380 CALL VCHAR(13,31,42,12)
2390 RETURN
2400 REM ***FIRING SIGN ON
2410 FOR SET=9 TO 11
2420 CALL COLOR(SET,2,14)
2430 NEXT SET
2440 RETURN
2450 REM ***FIRING SIGN OFF
2460 FOR SET=9 TO 11
2470 CALL COLOR(SET,2,2)
2480 NEXT SET
2490 RETURN
2500 REM ***LOADING SIGN ON
2510 FOR SET=5 TO 7
2520 CALL COLOR(SET,12,2)
2530 NEXT SET
2540 RETURN
2550 REM  **LOADING SIGN OFF
2560 FOR SET=5 TO 7
2570 CALL COLOR(SET,2,2)
2580 NEXT SET
2590 RETURN
2600 REM ***RADAR SCOPE
2610 FOR N=12 TO 21
2620 CALL VCHAR(15,N,159,8)
2630 NEXT N
2640 RETURN
2650 REM ***RADAR SCAN
2660 CALL SOUND(190,356,16)
2670 CALL COLOR(16,12,13)
2680 CALL COLOR(16,16,13)
2690 CALL COLOR(16,12,13)
2700 CALL COLOR(16,11,13)
2710 CALL COLOR(16,4,13)
2720 CALL COLOR(16,5,13)
2730 CALL COLOR(16,13,13)
2740 GOSUB 2560
2750 RETURN
2760 REM ***INSTRUCTIONS
2770 CALL CLEAR
2780 GOSUB 2510
2790 CALL COLOR(3,9,1)
2800 CALL COLOR(6,12,1)
2810 CALL COLOR(8,12,1)
2820 CALL SCREEN(2)
2830 PRINT "PRESS": :"<ENTER> FOR M
     ENU AND SCORE": :"<SPACE> FOR
     FIRING MODE": :"<ALPHANUMERIC
     KEYS> TO FIRE": :
2840 PRINT "RELEASE ALL KEYS FOR DE
     FENSE": : :
2850 PRINT "<<WITH 99\4A CTRL AND F
     CTN": :"KEYS EXTEND RANGE OF F
     IRE": :
2860 PRINT "AND ALPHALOCK SHIFTS AI
     M OF": :"LETTER KEYS> <TO SHIF
     T AIM ": :"OF NON ALPHA KEYS D
     EPRESS  ": :
2870 PRINT "BOTH SHIFT KEY AND NON
     ALPHA": :"KEY TOGETHER>>":
2880 IF DIS=1 THEN 2910
2890 INPUT A$
2900 GOTO 610
2910 RETURN
2920 REM  **TITLE/SCORE/MENU
2930 CALL CLEAR
2940 CALL COLOR(3,7,1)
2950 CALL COLOR(8,12,1)
2960 GOSUB 2510
2970 PRINT "       NIGHT BLOCKADE":
     :"         BY ANTS REIGO": : :
2980 PRINT "  ";TOTAL;"SUNK": :"  A
     CCURACY";INT(TOTAL/TOTSHT*100)
     ;"PERCENT": :
2990 PRINT "  PRESS NUMBER": :"  -1
     - NEW GAME": :"  -2- CONTINUE"
     :
3000 PRINT :"  -3- END": :"  -4- IN
     STRUCTIONS":
3010 CALL KEY(0,K,S)
3020 IF S=0 THEN 3010
3030 IF (K<49)+(K>52)THEN 3010
3040 SLN=K-48
3050 RETURN
3060 REM  ***REDEF 99/4 KEYS
3070 R(46)=11
3080 CL(46)=26
3090 R(13)=11
3100 CL(13)=29
3110 GOTO 710
3120 REM  ***MISSILE IMPACT
3130 FOR T=1 TO 4
3140 CALL SOUND(100,600,0,700,0,-2,
     0)
3150 CALL SOUND(100,110,28)
```

BLOCKADE

```
3160 NEXT T
3170 CALL SCREEN(10)
3180 CALL SCREEN(2)
3190 CALL SOUND(500,-7,0)
3200 CALL SCREEN(7)
3210 CALL SOUND(500,-7,15)
3220 CALL SOUND(500,-7,26)
3230 CALL SCREEN(16)
3240 CALL SCREEN(11)
3250 CALL SCREEN(2)
3260 IF SM=0 THEN 920
3270 CALL CLEAR
3280 CALL SOUND(900,20000,28)
3290 CALL SOUND(1,20000,28)
3300 GOSUB 2410
3310 GOSUB 2510
3320 DAM=INT(RND*2)+1
3330 IF DAM>=LIM THEN 3870
3340 PRINT "     damage report": :
     : : :"MISSILE IMPACT HAS WIPED
      OUT": :INT(DAM/LIM*100);"PERC
     ENT"
3350 PRINT "OF REMAINING FIRE POWER
     "
3360 PRINT : : : :
3370 LIM=LIM-DAM
3380 MIS=MIS+1
3390 CALL SOUND(3000,20000,28)
3400 CALL SOUND(1,110,28)
3410 CALL CLEAR
3420 GOSUB 2560
3430 GOTO 730
3440 REM  ***DEFEAT MESSAGE
3450 CALL CLEAR
3460 GOSUB 2510
3470 PRINT "  THE BLOCKADE IS BROKE
     N": : :"     THE WAR IS LOST":
      : : : : :
3480 CALL SOUND(3000,20000,28)
3490 CALL SOUND(1,20000,28)
3500 GOTO 610
3510 REM  ***MISSILE LAUNCH
3520 CALL HCHAR(T1,1,32,A-2)
3530 CALL HCHAR(T1,A+1,33)
3540 CALL HCHAR(T1,A,34)
3550 CALL HCHAR(T1,A-1,38)
3560 CALL HCHAR(T1,A+2,32,31-A)
3570 IF (A<5)+(A>28)THEN 3580
3580 CALL VCHAR(T1-1,A-1,136)
3590 CALL VCHAR(T1-2,A-1,63)
3600 CALL GCHAR(T1-3,A-1,CD)
3610 CALL VCHAR(T1-3,A-1,136)
3620 CALL SCREEN(7)
3630 CALL VCHAR(T1-1,A-1,32)
3640 CALL VCHAR(T1-4,A-1,43)
3650 GOSUB 2220
3660 CALL VCHAR(T1-4,A-1,32,4)
3670 CALL VCHAR(T1-3,A-1,CD)
3680 RETURN
3690 CALL HCHAR(T2,1,32,B-2)
3700 CALL HCHAR(T2,B+1,33)
3710 CALL HCHAR(T2,B,35)
3720 CALL HCHAR(T2,B-1,39)
3730 CALL HCHAR(T2,B+2,32,31-B)
3740 IF (B<5)+(B>28)THEN 3750
3750 CALL VCHAR(T2-1,B-1,136)
3760 CALL VCHAR(T2-2,B-1,63)
3770 CALL GCHAR(T2-3,B-1,CD)
3780 CALL VCHAR(T2-3,B-1,136)
3790 CALL SCREEN(7)
3800 CALL VCHAR(T2-1,B-1,32)
3810 CALL VCHAR(T2-4,B-1,43)
3820 GOSUB 2220
3830 CALL VCHAR(T2-4,B-1,32,3)
3840 CALL VCHAR(T2-3,B-1,CD)
3850 RETURN
3860 REM  ***DEFEAT MESSAGE
3870 CALL CLEAR
3880 GOSUB 2510
3890 LIM=0
3900 PRINT "    THIS GUN EMPLACEMENT
     ": : :"     HAS BEEN DESTROYED"
     : : :
3910 GOTO 3480
```


Send in your Photos and Anecdotes

Do you have a favorite photograph (color or black and white) featuring an unusual application of your Home Computer? Would you like to share your unusual or amusing anecdotes relevant to Home Computing? *99'er Home Computer Magazine* will pay $25 for items it publishes. Material chosen will be subject to the same copyright treatment as "Letters to the Editor" as set forth on the Masthead page. No submissions can be returned. Send anecdotes and copies of photos to: Pot Pourri Editor, 99'er Home Computer Magazine, 1500 Valley River Drive, Suite 250, Eugene, Oregon 97401.

Printers On Review...from p.19

If you are going to connect the 83A to the TI-99/4A computer, you will need to alter the RS232 cable connecting the printer to the TI RS232 interface card. The wires to pins 11 and 20 must be interchanged on one end, or the computer will keep writing to the 83A even after the buffer is full, resulting in incorrect or lost information.

Graphics

The 83A comes standard with a fixed set of block graphics characters. These characters are accessible with ASCII values 128 through 191, and repeated again at ASCII 192 to 255. The same type-styles for characters (such as condensed, or enlarged) can be assigned to block graphics, expanding their range of graphic effects.

Documentation

The 83A includes a 75-page user's manual, and 7-page instruction manual. Both are informative, but finding specific information can be time consuming. The information presented could have been better formatted. Some of the explanations are too technical for the average consumer and are geared more for the hobbyist and serious programmer.

Olive-1™

If you already own an Olivetti PRAXIS electronic typewriter—or are thinking of purchasing one—correspondence-quality printing with your Home Computer is now possible with the addition of the Olive-1 RS232 interface kit. If you do not own an Olivetti PRAXIS typewriter, the Olive-80™ typewriter/printer package is available from The Olive Branch Association, Ltd. for a suggested retail price of under $750.00. The Olive-1 interface alone sells for a suggested retail price of $249.00.

Special Features

The Olive-1 is a serial communications interface (RS232), compatible with the TI-99/4A. The Olive-1 lets you convert the Olivetti PRAXIS typewriter into a powerful letter-quality printer. If you have completed one of the more complex *HeathKit*™ projects (such as a stereo amplifier) you can probably install this interface yourself. If you lack the necessary skills, Olive Branch will install the interface for $50.00.

The Olive-1 is a grey box measuring 1.5" × 5" × 5.25". It has three connections. The first is a 9-volt cable supplied from a calculator-type power supply. (Note: Two AC wall outlets will be required, one for the PRAXIS and one for the Olive-1). The second is a flat ribbon cable which you must install in the PRAXIS typewriter. The third is the RS232 cable which connects to the RS232 interface card in the TI Peripheral Expansion Box.

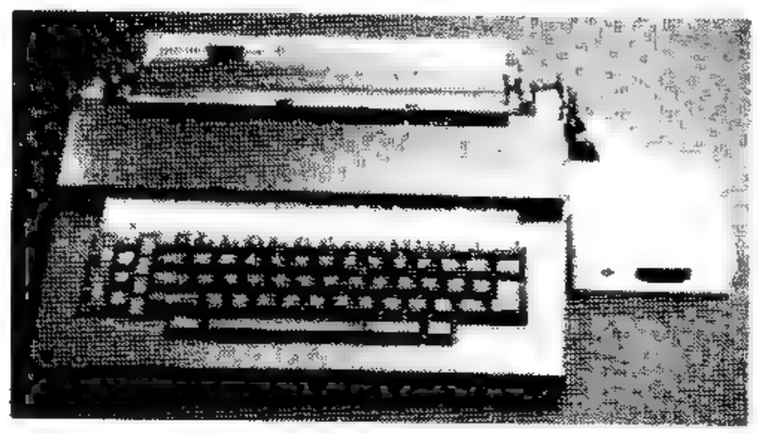
One feature really sets this printer apart from the others: You can, at any time, stop sending information from the computer and type right on the paper from the typewriter keyboard. Olive Branch has not, however, made provisions for transmission from the keyboard back to the computer.

The PRAXIS typewriter is capable of printing up to 165 characters per line at a speed of 12 characters per second. Used as a typewriter, it contains a 10-character buffer with automatic correction. The Olive-1 gives the PRAXIS a 165 character buffer, and can accept three baud rates: 110, 300 and 1200 bps. The PRAXIS also features an interchangeable daisy-wheel printing element.

The following is an example of the PRAXIS type:

Olive-1 ™

At the tir
format wil
MANUAL wi
registere
comes off
the initi
testing o



Documentation

The Olive-1 comes with two separate manuals. The installation manual is very clear and must be read completely if you decide to do the installation yourself. Our feeling is that an experienced technician should do the job—to ensure proper operation and to avoid damage to the PRAXIS.

At the time of our evaluation, the user's guide was in a provisional format with the attached statement "The forthcoming OLIVE-80 USER'S MANUAL will cover in depth what the present text can only hint at. Every registered OLIVE-80 owner will receive the user's guide as soon as it comes off the press."

The 18-page provisional manual covers the initial connection and testing of the installation. This guide lacks information on utilizing the super-fancy printing capabilities of the system, but much of this can be figured out by most users. Besides, the system is very useful without all the "bells and whistles."

Who Needs A Printer?!...from p.17

single character or changing the margin alignment? These capabilities are luxuries for some users, necessities for others.

After the Honeymoon

Looking ahead, think about operating costs and maintenance—especially in terms of the two major consumables: (1) ribbons and (2) print heads or daisy-wheels. Before choosing between two similar printers, compare the costs of replacing these items. Find out the estimated life of each, in terms of total characters printed. How convenient is it to replace a ribbon? Can you replace the print head, or is that a service center procedure?

If you follow these guidelines in making your purchase, you will easily learn to live with, and even love, your new printing partner.

General Comparison of Printers

Now let's make some general comparisons so that you can better choose a printer that will fit your needs.

If, for example, type-styles are a major concern, the Gemini-10 has an outstanding selection. It is also capable of dot-graphics, as are the TI 99/4 Impact Printer and Print Mate 99 printer. If speed is of the utmost importance, the Microline 83A will finish first at 120 cps, although the Print Mate 99 and Gemini-10 are not far behind at 100 cps.

Three printers have wide carriages—the Microline 83A, a wide-carriage model of the Gemini-10 (the Gemini-15) and the wide-carriage model of the PrintMate 99 (the PrintMate 150).

For quality of print, the Olivetti is in a class by itself. It is a relatively slow printer with single-sheet feed only, but its daisy-wheel provides letter-quality characters.

Now down to the money. It is misleading to make quick comparisons of suggested retail prices without considering hidden costs. You have to consider the cost of ribbons: $2-$5 for the spool-type used on the Microline 83A and Gemini-10, and $8-$16 per cartridge for the others. Also, the cost of different paper types may be a consideration.

These many factors make your decision a complex one, but it is worth the effort to take the necessary time in selecting the printer that will best fit your requirements.

For Further Information:

On the Gemini-10 Printer contact:
Star Micronics, Inc.
Suite 216
1120 Empire Central Place
Dallas, TX 75247

On the Microline 83A contact:
Okidata Corp.
111 Gaither Drive
Mt. Laurel, NJ 08054

On the Olive-1 Kit contact:
The Olive Branch Association, Ltd.
26291 Production Ave., Ste. 205
Hayward, CA 94545

On the PrintMate 99 Printer contact:
Micro Peripherals, Inc.
4426 South Century Drive
Salt Lake City, UT 84107

On the TI 99/4 Impact Printer contact:
Texas Instruments
Consumer Relations Dept.
P. O. Box 53
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Adventuring... from p.50

All of these have been done. Try to come up with something original.

Set up a sequence that will support the theme. For example, if the theme is to escape a burning building, maybe the adventurer should pour water on a key (otherwise too hot to handle). If the adventure takes place in Darkest Africa, maybe you should have the hero meet up with a lion, which he must face with a bow and arrow. Now let him find a bow, but make him fashion his own arrows

Make up a list of objects that are in keeping with the sequence. To pour water, you will need a source and some kind of container. To kill the lion, you'll have to add a lion, a bow, a knife, a bowstring, and a tree branch (for the arrows). You may want to add a tree and make the hero cut a branch.

Make up a list of verbs your program can understand. To kill that lion, you will need words like cut (branch), whittle (branch), tie (bowstring), fire (arrow or bow), and kill (lion). Don't make the list too long, and provide alternative words that will be legal: (e.g., "hack" for "cut.")

Draw up a map. First enter the usual connections. Then add the more devious ones that require the player's imagination. Start adding objects to the rooms. Spread the objects around so that, for example, the knife, the bow, and the bowstring are not in the same or adjoining rooms.

Write a list of room descriptions. Try to describe everything visible but don't give *too* many details. You could chew up too much memory for the adventure to fit into your computer.

Now you can begin writing that great adventure epic that you have been dreaming of. After it has been written and debugged, ask a friend (or enemy) to give it a try. Accept any constructive criticism. The game may be too hard or too easy. Maybe it has some illogical events. Listen to your critics carefully. You can never tell how difficult your adventure is, because *you* created it. You know that he has to make an arrow to kill the lion, but unfortunately no one else may think of it. Having completed your adventure, you can congratulate yourself on joining the illustrious ranks of adventure creators, just like Scott Adams!

Index to Advertisers

Aerocomp 37
American Software Design & Distribution Co. 33
Bach Company, The 21, 35, 37
BeeJay Funware 21
Canadian Micro Works 58
Cintronics 23
Complete Software Co. 54
Computer Peripheral Resources 23
Control Data Corp. 28, 29
Corn Software 51
Cumberland Technology 55
Denali Data Design 62
Destiny Computer Services 60
Dhein's True Value 10, 34
Dollard, Walter J. 55
Dow, John T. 38
Dynamic Data & Devices 39
Eastbench Software Products 38
Ehninger Associates Inc. 16
Elek-Tek, Inc. 13
Ermware 55
Extended Software Co. 63
FFF Software 33
Great White North Software Co., The 52
Hardin's Computer Solutions, Inc. 14
Harvey, James 54
Headwind Software 33
Hi-Tech Systems 35
Intersoft 59
J & K H Software 61
Kuhl Software 60
LOGIX 18
Micro-80 Inc. 21
Micro-Ed, Inc. 59
Micro Peripherals, Inc. 71
Millers Graphics 33
Moonbeam Software 3
MYARC, Inc. 61
NSY Software 51
North Hills Computer 52
Northern Light Software 51
Norton Software 53
Not Polyoptics 17
Novadata Systems Incorporated 23
Oak Tree Systems 39
Pablo Diablo 38
Pegasus Software 53
Pewterware 37
Practical Software 63
Republic Software 19
Scotch Marketing Inc. 12, 20
Scott, Foresman and Company 2
Software Specialties, Inc. 51
Software Support 32
Star Micronics 15
TENEX 50
Texas Instruments, Inc. 8, 70, 72
Tex-Comp Users Supply Division 24, 62
Tex-Soft 37
Textiger 39
Tomputer Software 54
Unisource Electronics, Inc. 57
WMS 59
Western Ware Inc. 38
YCAN Systems, Inc. 66
York 10 Computerware 60
99/4A Program Exchange 61
99'er Bookstore 36
99'er Magazine 65
99'er-ware 68, 69

ASPIC . . from p.58

any pattern that will let us predict how many 9's we need?

NINES

```
10 CLEAR
20 PRINT "WHAT IS THE DIVISOR"
30 ASK FOR DIV
40 REPEAT UNTIL DIV=0
50 PRINT "THE REMAINDERS ARE:"
60 LET REM=9
70 REPEAT UNTIL REM<DIV
80 LET REM=REM  DIV
90 END
100 PRINT REM
110 LET COUNT=1
120 REPEAT UNTIL REM=0
130 LET REM=10*REM
140 LET REM=REM+9
150 REPEAT REM/DIV
160 LET REM=REM DIV
170 END
180 PRINT REM
190 LET COUNT=COUNT+1
200 END
210 PRINT "THE NUMBER OF RE-
    MAINDERS WAS"
220 PRINT COUNT
230 PRINT "WHAT IS THE DIVISOR"
240 ASK FOR DIV
250 END
```

Nines performs divisions for children, who might otherwise produce errors that would spoil the patterns. Of key interest here is the sequence of remainders obtained in dividing strings of 9's. The number of remainders needed to get a 0 remainder is the number of 9's we are looking for:

```
   027
37 |999
    0
    99          9 was the first remainder
    74
    259        25 was the second remainder
    259
      0         0 was the third remainder
```

In *Nines*, the successive remainders are displayed until the remainder is 0, then the number of remainders is displayed. Lines 20-30 ask for the first divisor. Lines 60-110 calculate, print and count the first remainder. Lines 120-200 handle the rest of the sequence as follows: Lines 130-140 "bring down the next 9" as we do in the long division process. Lines 150-170 compute the remainders (Note that Lines 70-90 and 150-170 have the same effect. Either can be used in both places if you wish!) Line 180 prints the remainder. COUNT, which keeps track of the number of remainders, is increased in Line 190. Lines 210-220 print the total number of remainders needed. Lines 230-240 ask for the next divisor, and Line 250 returns control to Line 40. To stop the program, enter 0 as a divisor.

Nines happens to bring up a typical mathematical question: How do we know if the division will come out even? If we use a divisor of 6, for example, it won't work! This will cause an infinite loop in Lines 120-200. The program will keep printing out remainders "forever" or until the number of remainders gets too large for the computer to handle. (It will certainly seem like forever.) To stop the program, you must use the ASPIC break key, which is the '?'. (You may have to hold it down for a second). Part of the research then becomes the question: "For which divisors will I get an infinite sequence of remainders?" The process of gathering data to answer one question raises new questions! This is very common in creative mathematical work.

The programming in *Nines* shows the value of the REPEAT UNTIL command in ASPIC. The loop structure in BASIC (FOR . . . NEXT) would require us to know how many remainders we will need. But this is precisely what we are trying to find out! The use of an IF statement is necessary in BASIC. This illustrates the difficulty a beginner faces in trying to express thought patterns clearly in a computer language like BASIC. In ASPIC, all groups of commands that are to be repeated are labeled REPEAT! (It should be noted for those who know the Pascal language that REPEAT UNTIL in ASPIC is an entry-checking loop. There is no exit checking loop).

The four programs given here show different ways a computer can be used in the classroom. We hope that teachers will be able to take these as models for designing and writing their own programs in ASPIC.

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CONSIDER THE FEATURES—Only PrintMate™ 150 offers so many ways to get your message across: graphics; display fonts; downline loadable character sets; high print speed; advanced logic seeking; 15 inch wide carriage; a variety of forms and paper capabilities and; friendly "SoftSwitch™" interaction. The PrintMate™ 150 is the responsive performer that perfectly mates with your microsystem or personal computer. With prices beginning at $995, it is evident that the PrintMate™ 150 is the superior performer in function and price.

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TI LOGO: It opened a door they thought was locked.

It opened a door to their minds.

The key: a Texas Instruments Learning Computer and TI LOGO, a programming language developed by TI and MIT.

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The TI Learning Computer, with TI LOGO and many other educational programs, is equipped to help open doors in any classroom. Including yours. For information on this remarkable system, contact: Texas Instruments Customer Relations, P.O. Box 53 Lubbock, Texas 79408.

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